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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

IN RE TWITTER, INC. SECURITIES
LITIGATION

Case No. 3:16-cv-05314-JST

REPORT ON LOSS CAUSATION AND DAMAGES

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I. SCOPE OF PROJECT AND REPORT

1. In my expert report dated 15 February 2018 (“February Report” or “Feinstein Report”), I examined factors that are generally accepted as indicative of the efficiency of the market in which a security trades. Based on my analysis of those factors, I concluded that Twitter, Inc., (“Twitter” or the “Company”) stock traded in an efficient market during the period 6 February 2015 through 28 July 2015 (the “Class Period”).¹
2. In my February Report, I showed that each of the *Cammer* and *Krogman* factors supports a finding that Twitter stock traded in an efficient market throughout the Class Period,² and I further demonstrated – through an event study – that Twitter stock reacted promptly to new Company-specific information as it entered the market.³ Reacting promptly to new material information is the hallmark of an efficient market. In my February Report, I further explained that Section 10(b) damages for all Class Members could be computed using a common methodology.
3. Subsequently, I was asked by Motley Rice LLC and Robbins Geller Rudman & Dowd LLP, Co-Class Counsel for Class Representatives,⁴ to determine whether investors who purchased Twitter stock during the Class Period suffered losses as a result of Defendants’ alleged misrepresentations and omissions described in the Consolidated Amended Complaint for Violations of the Federal Securities Laws, filed 2 March 2017 (the “Complaint”).⁵ I was also asked to quantify damages sustained, if any, on a per share basis.
4. Toward these ends, I analyzed a wide variety of information and documents, including Company press releases, conference call transcripts, equity analyst reports, news articles, SEC filings, Company documents obtained through discovery, deposition testimony,

¹ Unless otherwise indicated, capitalized terms used herein have the meaning ascribed to them in the Feinstein Report.

² Feinstein Report, ¶17.

³ *Id.*, ¶18.

⁴ The Court appointed KBC and National Elevator Industry Pension Fund as Co-Class representatives (“Plaintiffs”).

⁵ I have assumed Plaintiffs will be able to prove their factual allegations. *See*, “Reference Guide on Estimation of Economic Damages,” *Reference Manual on Scientific Evidence*, 3rd Edition, 2011, p. 432 (“In almost all cases, the damages expert proceeds on the hypothesis that the defendant committed the harmful act and that it was unlawful.”)

prices of the stock, performance of the overall market, and performance of Twitter's industry sector, as well as other data and documents. I also read and considered the Court's Order Granting in Part and Denying in Part Defendants' Motion to Dismiss, dated 16 October 2017 ("Motion to Dismiss Order"), and the Court's Order Granting Class Certification, Appointment of Class Representatives, and Approval of Class Counsel, dated 17 July 2018 ("Class Certification Order").

5. This report presents my methodology, findings, and conclusions relating to loss causation and the quantification of damages.
6. Exhibit-1 lists the data and documents in addition to those materials cited in my February Report that I considered in conducting my analysis and arriving at the conclusions expressed herein. My credentials and compensation are presented in the Feinstein Report, as is a list of testimony within the four years preceding that report. Exhibit-2 presents my updated curriculum vitae. Testimony I have provided since the submission of the Feinstein Report is identified in Exhibit-3.
7. I reserve the right to amend, refine, or modify my opinion and report, including in the event any new or additional information or analysis becomes available.

II. CONCLUSIONS

8. The alleged misrepresentations and omissions caused the price of Twitter stock to be artificially inflated over the course of the Class Period and were a substantial cause of the losses suffered by the Plaintiffs and Class members following corrective disclosures. Corrective disclosures during the Class Period dissipated the artificial inflation, which in turn caused the stock price to decline, thereby causing investor losses.
9. These conclusions are based on fundamental principles of finance and valuation, on analysis of Company statements, internal Company documents and communications, the deposition of Twitter executives, news articles, analyst reports, and event study analysis.
10. Investors suffered losses upon disclosure of the Company's poor user growth and user engagement trends, and financial implications associated therewith. The concealment of this information during the Class Period by the alleged misrepresentations and omissions caused investor losses.

11. In particular, the event study analysis, which considered and accounted for potentially confounding information, establishes that the alleged misrepresentations and omissions caused the price of Twitter stock to be artificially inflated, and that corrective disclosures caused stock price declines and investor losses. For the reasons explained herein, it is my opinion that the partial disclosures of the alleged truth explained a substantial portion of Twitter's residual stock price decline on 28 April 2015, all of the residual stock price decline on 29 April 2015, and all of the net residual stock price decline from 29 July 2015 through 3 August 2015.⁶
12. Any investor who purchased Twitter stock during the Class Period when the price was artificially inflated and held that stock beyond a corrective disclosure suffered a loss that was caused by the misrepresentations and omissions. Per share damages ranged up to \$20.34 per share, depending on the timing of the stock purchase and sale.

III. FACTUAL BACKGROUND

A. About the Company

13. Twitter operates a global social media and news platform, through which users can create and share content.⁷ The Company generates revenue from advertising services and data licensing.⁸ However, the "substantial majority" of the Company's revenue is "from the sale of advertising services."⁹
14. For the fiscal years ("FY") 2014 and 2015, the Company reported revenues of \$1.40 billion and \$2.22 billion, respectively.¹⁰ In FY2015, advertising revenue comprised \$1.99 billion of the Company's \$2.22 billion revenue, or approximately 90%.¹¹ The Company has historically experienced seasonality in its advertising revenue growth, with higher

⁶ If the trier of fact determines that Twitter's stock price fully reflected the valuation impact of the corrective disclosures at the close of trading on 29 July 2015 (and subsequent losses are not recoverable), per share damages would range up to \$18.33 per share, depending on the timing of the stock purchase and sale.

⁷ Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, p. 5.

⁸ Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2015, filed 29 February 2016, p. 47.

⁹ Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, p. 44.

¹⁰ Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2015, filed 29 February 2016, p. 47.

¹¹ Id., p. 42.

advertising revenue growth from third quarter to the fourth quarter as compared to growth from fourth quarter to the following first quarter.¹²

15. Throughout the Class Period, the Company's stock was traded on the New York Stock Exchange ("NYSE") under the ticker symbol TWTR.¹³
16. From the time of its initial public offering in November 2013 and continuing through the end of the Class Period, Twitter emphasized three critical success factors for its business: user growth, user engagement and monetization.¹⁴ Twitter described the relationship among these three factors and specifically emphasized the dependency of user growth upon user engagement.

*"The size of our user base and our users' level of engagement are critical to our success. ... If we fail to grow our **user base**, or if **user engagement** or the number of paid engagements with our pay- for- performance Promoted Products, which we refer to as **ad engagements**, on our platform decline, our revenue, business and operating results may be harmed. ... To the extent our **user growth rate** slows, our success will become increasingly dependent on our ability to increase levels of **user engagement and ad engagement** on Twitter."*

Twitter, Inc., Form S-1/A, filed 4 November 2013, pp. 8, 16 (emphasis added).

17. Prior to and during the Class Period, the Company explained that its revenue and future revenue growth would be dependent on these three factors:

*"We believe that our future revenue growth will depend on, among other factors, our ability to **attract new users, increase user engagement and ad engagement**"*

Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, p. 18 (emphasis added).

¹² Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, p. 51.

¹³ Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2015, filed 29 February 2016, p. 9.

¹⁴ Twitter, Inc., Form S-1/A, filed November 4, 2013, at 67. *See also*, Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015.

“Our financial performance has been and will continue to be significantly determined by our success in growing *the number of users* and increasing *their overall level of engagement on our platform* as well as *the number of ad engagements*.

Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, p. 11 (emphasis added).

"Our advertising revenue could be adversely affected by a number of other factors, including: *decreases in user engagement with Twitter and with the ads on our platform ...*."

Id., p. 12 (emphasis added).

“As *our user base* and the *level of engagement* of our users grow, we believe the potential to increase our revenue grows.”

Id., p. 47 (emphasis added).

18. During the Class Period, the Company explained, “We review a number of metrics ... to evaluate our business, measure our performance, identify trends affecting our business, formulate business plans and make strategic decisions.”¹⁵ Among the “Key Metrics” identified by the Company for evaluating its business was MAU, or “monthly active users,” which was used to measure user growth.¹⁶ The Company defined monthly active users (“MAU”, “MAUs”, or “user base”) as follows:

“Twitter users who logged in or were otherwise authenticated and accessed Twitter through our website, mobile website, desktop or mobile applications, SMS or registered third- party applications or websites in the 30- day period ending on the date of measurement.”

Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2015, filed 29 February 2016, p. 43.

¹⁵ Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, p. 4.

¹⁶ Id., p. 4.

19. In addition to user base, a second critical success factor for Twitter was user engagement. Daily active users (“DAU” or “DAUs”) was a primary user engagement metric. While MAU tracked the Company’s active user base, the ratio of Twitter’s DAU to MAU (“DAU/MAU”) measured the user engagement among the user base.¹⁷ Plaintiffs allege that despite tracking DAU and DAU/MAU prior to and during the Class Period, Twitter failed to report these “key metrics” to investors during the Class Period.¹⁸

B. Summary Of Plaintiffs’ Allegations

20. Plaintiffs allege that during the Class Period, Defendants misled investors by concealing adverse user engagement and user growth trends, and the impact of those adverse trends on Twitter’s user growth prospects and revenues.
21. Plaintiffs further allege that, contrary to the Company’s misrepresentations, Twitter had “a primary, undisclosed, user engagement metric during the Class Period ... DAU,”¹⁹ which was not disclosed to investors. Plaintiffs contend that by concealing the DAU metric and DAU/MAU ratio trend, the Company hid adverse trends in user engagement and user growth. Concealing these trends, according to the Complaint, denied investors accurate understanding of the Company’s business prospects.

“In isolation, neither MAU nor user engagement provides a complete picture of the business. In Twitter’s case, the platform could have millions of users sign up (i.e., high MAU) but if those users logged in to the platform only once a month (i.e., low engagement), the business would suffer because fewer ads can be sold. Alternatively, the platform could have very

¹⁷ See, “Additionally, on the consumer side, many companies use DAU to MAU” (“Q4 2014 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 5 February 2015, 5:00 PM, p. 8); and “Major Growth Drivers 284 M Monthly Active Users 48% Top 20 Markets DAU/MAU Ratio ... Growth Opportunity Frequency of Use – DAU/MAU Ratio 48% Current Top 20 DAU/MAU Ratio +3% → 51% Potential Top 20 Market DAU/MAU Ratio ... Increasing Frequency of use as measured by DAU/MAU may increase our Revenue by \$0.5B ... Summary of Growth Opportunities Key Drivers ... Increase Frequency of Use in all Markets, with Particular Focus on Top 20 Markets.” (“Financial Overview,” Internal Company presentation, [TWTR_SHEN_00000168-195 at 173, 184-185, and 188].)

¹⁸ See, e.g., [TWTR_SHEN_00327976-979.0028] and [TWTR_SHEN_00349769-790].

¹⁹ Complaint, ¶5.

active users who logged in multiple times a day (i.e., high engagement) but if the total number of users on the platform was limited (i.e., low MAU), the business would suffer for the same reason. The interplay between the two metrics also meant that user engagement data became more important if MAU was flat or declining.”

Complaint, ¶24.

22. The Complaint alleges that the Company not only concealed the adverse trends, but went so far as to misinform investors that “‘user engagement was rising.’”²⁰
23. I understand that the court in this matter has acknowledged the importance of adverse user engagement trends to investors in Twitter stock, specifically if the adverse trends run contrary to a publicly disclosed metric.

“Second, Plaintiff argues that omission of the DAU metric was misleading when set against Twitter’s statements regarding MAU growth. Specifically, Plaintiff claims that ‘without DAU, investors were led to believe that Defendants’ outsized MAU projections were viable, MAU growth was high quality (i.e., new users were just as engaged as existing users), and new product features designed to increase growth were working.’ ... Again, although this Court acknowledges that there is no duty of completeness, a plaintiff can state a 10(b) claim based on a failure to provide ‘context’ where that failure ‘affirmatively create[s] an impression of a state of affairs that differs in a material way from the one that actually exists.’ Indeed, Twitter acknowledges the viability of this theory in its motion. ... To succeed on this theory, Plaintiff must allege that Twitter reported positive MAU growth, that Twitter was simultaneously experiencing adverse DAU trends, and that those DAU trends made MAU growth implausible. Plaintiff has sufficiently pleaded all three steps.”

Motion to Dismiss Order, p. 23 (internal citations omitted).

“Plaintiff has plausibly alleged, through statements by Defendants, the CWs, and analysts, that MAU is unhelpful at best and misleading at worst in the absence of companion DAU data.”

Id., p. 25.

²⁰ Complaint, ¶6.

24. Plaintiffs contend that when these adverse trends, and/or the valuation implications associated therewith, were disclosed to the marketplace via corrective disclosures, the price of Twitter stock declined, causing investor losses.²¹

C. Timeline of Events

25. A review of the following events provides background and context for understanding the status quo in relation to Plaintiffs' allegations and the Company's condition prior to and during the Class Period. Included are descriptions of some of Defendants' alleged false statements and omissions, internal Company communications, deposition testimony of Twitter executives, as well as media and analyst commentary.

1. Pre-Class Period Event: 12 November 2014: Twitter Hosts Analyst Day

26. On 12 November 2014, Twitter hosted the Company's inaugural "Analyst Day", the first comprehensive non-earnings presentation to analysts following Twitter's pre-IPO roadshow.²² In his prepared statements, Twitter CEO Dick Costolo explained that the event was designed to provide analysts with a review of the Company's first year as a public company. CEO Costolo also proclaimed that the Company's "aspirational goal" was to build "the world's largest daily audience."²³
27. In his overview of the day's events, CEO Costolo stated that Twitter's CFO Anthony Noto would discuss the Company's "plans to drive both revenue and EBITDA."²⁴ He also acknowledged that one of the reasons why analysts were in attendance was to "understand the operating metrics like MAU that are inputs into the financial success that we have as a company."²⁵ To achieve the Company's "aspirational goal of building the

²¹ Id., ¶8.

²² "Twitter, Inc. Analyst Day," *Factset:callstreet*, corrected transcript, 12 November 2014, p. 4.

²³ Id., p. 5.

²⁴ Id., p. 4.

²⁵ Id.

world's largest daily audience," CEO Costolo explained that the "first objective [was] to strengthen the core, our monthly active users."²⁶

28. In his prepared remarks, CFO Noto elaborated on the Company's aspirational goals, stating that Twitter was aspiring to "be one of the top revenue generating Internet companies in the world."²⁷
29. During his "Financial Overview" presentation at Analyst Day, CFO Noto displayed a series of slides and commented on "the key growth drivers" for Twitter's business.²⁸ The second slide of CFO Noto's presentation was titled "Major Growth Drivers."²⁹ The second major growth driver listed on that slide was the DAU/MAU ratio, which CFO Noto explained was the best way to quantify the impact of user engagement.
30. While discussing the Company's growth and revenue drivers, CFO Noto explained that if the Company were able to double MAU by 2018 (from 284 million to 560 million) and maintain the current DAU/MAU ratio of 48%,³⁰ it would incrementally increase annual revenue by \$4.6 billion.³¹ If the Company were able to increase the DAU/MAU ratio by 3 percentage points, from 48% to 51%, it would generate \$500 million of incremental revenue.³²

"Frequency. We haven't spent a lot of time talking about DAU-to-MAU. And we thought about different types of measurements, engagement measurements, et cetera. *The best way to quantify the impact of engagement, and we have a lot of different metrics for engagement was to give you the perspective that our top 20 markets DAU-to-MAU is 48%.*

²⁶ Id., p. 5.

²⁷ Id., p. 8.

²⁸ Id., p. 92.

²⁹ "Financial Overview", Company presentation, Exhibit 27, [TWTR_SHEN_00000168-195, at 173].

³⁰ Factors assumed held constant include ad load at 5%, and cost per engagement ("CPE") and click-through rate ("CTR") at Q3 2014 levels. "Twitter, Inc. Analyst Day," *Factset:callstreet*, corrected transcript, 12 November 2014, p. 94.

³¹ "Twitter, Inc. Analyst Day," *Factset:callstreet*, corrected transcript, 12 November 2014, p. 94.

³² See, also, "Major Growth Drivers 284 M Monthly Active Users 48% Top 20 Markets DAU/MAU Ratio ... Growth Opportunity Frequency of Use – DAU/MAU Ratio 48% Current Top 20 DAU/MAU Ratio +3% → 51% Potential Top 20 Market DAU/MAU Ratio ... Increasing Frequency of use as measured by DAU/MAU may increase our Revenue by \$0.5B ... Summary of Growth Opportunities Key Drivers ... Increase Frequency of Use in all Markets, with Particular Focus on Top 20 Markets." ("Financial Overview," Internal Company presentation, [TWTR_SHEN_00000168-195 at 173, 184-185, and 188].)

Again, they account – those markets account for 80% of our users and 90% of our revenue. If we were able to move the entire top 20 markets to 51% and you could imagine the first 10 markets probably have a higher DAU than the next 11 markets, if we're able to move the DAU-to-MAU ratio from 48% to 51%, that would generate an incremental \$500 million and that's using again 5% ad load, 560 million MAUs, constant CPE and constant click-through rate."

"Twitter, Inc. Analyst Day," *Factset:callstreet*, corrected transcript, 12 November 2014, p. 94 (emphasis added).

31. Following the Company's Analyst Day, analysts commented on the Company's aspirational goals and the need for additional metrics to measure engagement.

"We are hopeful of more metrics that show daily behaviors. The company has a stated goal of wanting to become the largest daily user base. If daily users are what the mission is, daily or daily/monthly metrics should be key to proving out success. ... Why Overweight? We believe Twitter will be able to continue to narrow the monetization gap internationally and further increase engagement among current and new subscribers given new products and features."

"Flight Plan – Analyst Day Thoughts," by Paul Vogel, et al., *Barclays*, analyst report, 13 November 2014, pp. 1, 2.

"PATH TO >\$11B IN REVS WITH HIGHER MARGINS. Anthony Noto, CFO, walked investors through several key metrics such as ad load (1.3%), logged out user base (500m+), syndicate reach (185B impressions per Q), advertiser base (60k), and SMB reach. Most importantly, he also laid out a case for \$11.4B in incremental revenue driven by: an increase in ad load to 5% (\$5B), MAU growth to 560m (\$4.6B), a 3% increase in daily usage (\$500m), and Logged Out user monetization (\$1.3B). Further, LT margin guidance was raised by 500 bps to 40-45%. REMAINING QUESTIONS. While the company did a good job addressing most questions, we think there are still several questions remaining like: 1) the reason for the softer 4Q MAU guidance, 2) the appropriate metric for engagement"

"Management Delivers in 'Watershed Moment,'" by Robert Peck, et al., *SunTrust Robinson*, analyst report, 13 November 2014, p. 1.

“TWTR set some ambitious goals as it aims to have the largest DAU in world with over \$14 billion of annual revenue and a 40% to 45% EBITDA margin. The path will rely on new products, better engagement of core users, higher ad load, and efforts to monetize the 500mm non-logged users that are exposed to TWTR each month. Although investors should still be somewhat skeptical, the details on new products and initiatives are encouraging and lead us to be incrementally optimistic.”

“8 Hours of Optimism,” by Tony Wible and Murali Sankar, Janney Capital Markets, analyst report, 13 November 2014, p. 1.

“DAU/MAU ratio. DAU as a % of MAU is currently 48%, but management thinks this can increase to 51% as users become more engaged with the platform, particularly in the top 20 markets. This would yield an additional \$500M in revenue.”

“Investor Day 2014 Recap,” by Arvind Bhatia and Brett Strauser, Sterne Agee, analyst report, 13 November 2014, p. 2.

“Monetization should continue to drive near-term results, but solid sequential growth in users and higher engagement will be key to drive the stock higher from here, in our view.”

“Solid 4Q:14 Expected; Monetization Key Driver ST/Users Matter LT,” by Youssef Squali, et al., Cantor Fitzgerald, analyst report, 2 February 2015, p. 1.

2. 5 February 2015: Twitter Announces Q4 and FY 2014 Financial Results

32. On 5 February 2015, after the close of trading, the Company announced its financial results for Q4 and FY 2014 and held a conference call with investors.³³ For the quarter, the Company reported revenue of \$479 million (above consensus estimates of \$454 million).³⁴

³³ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 5 February 2015; and “Q4 2014 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 5 February 2015, 5:00 PM; Twitter Q4 2014 Earnings Follow-Up Call, [TWTR_SHEN_00185440-62].

³⁴ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 5 February 2015, p. 1. All consensus estimates are obtained from FactSet.

33. The Company also provided Q1 and FY 2015 guidance.³⁵ The Company established Q1 2015 revenue guidance at \$440-\$450 million (the midpoint was below consensus estimates of \$449 million), and FY 2015 revenue guidance range at \$2.30-\$2.35 billion (above consensus estimates of \$2.29 billion).³⁶
34. The Company reported that it finished Q4 2014 with 288 million MAUs (below consensus estimates of 294 million), a net increase of 4 million users over Q3 2014.³⁷ On the conference call, CEO Costolo attributed the miss in net MAU adds in Q4 to “quarter-specific factors,” including seasonality and issues related to the rollout of the iOS 8 integration.³⁸
35. CEO Costolo highlighted that the Company’s MAU trend “ha[d] turned around” as of Q1 2015, and that the Company expected Q1 2015 MAU net additions to be in the range of 13-16 million.³⁹ The Company attributed this reversal in trend to “a combination of seasonality, a return to organic growth, and the set of product initiatives we’ve created to drive growth.”⁴⁰

“[Anthony Noto – CFO]: Importantly, we are pleased to see that are current Q1 trend in MAUs will likely result in our Q1 MAUs returning to the level of absolute net ads [*sic*] that we saw during the first three quarters of 2014.”
“Q4 2014 Twitter Inc Earnings Call,” Thomson Reuters, conference call, 5 February 2015, 5:00 PM, p. 6.

“[Dick Costolo – CEO]: The user numbers we saw on January, again, indicate that our MAU trend has already turned around, and that Q1 trend is likely to be back in the range of absolute net ads [*sic*] that we saw during the first three quarters of 2014. So we’re in a great place there. And, again, I would stress that it’s seasonality, a return to organic growth, and product initiatives, all taken together.

³⁵ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 5 February 2015; and “Q4 2014 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 5 February 2015, 5:00 PM.

³⁶ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 5 February 2015.

³⁷ “Q4 2014 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 5 February 2015, 5:00 PM, p. 3.

³⁸ *Id.*, pp. 3, 6.

³⁹ *Id.*, p. 9.

⁴⁰ *Id.*

[Anthony Noto – CFO]: Paul, one thing I want to clarify is, you mentioned the word acceleration. And so, for everyone’s benefit, we added 14 million monthly active users on a net basis sequentially in Q1 of 2014. In Q2 of 2014, we added 16 million net monthly active users. And then, in the third quarter, we added 13 million. When we say that Q1’s trends are likely to indicate that we [*sic*] back towards the trend of absolute net ads [*sic*] in Q1 through Q3 of 2014, we’re referring to those specific numbers -- 14 million, 16 million and 13 million, not anything else from a percentage basis.”

Id., p. 9.

36. On the conference call, the Company reported timeline views and timeline views-per-MAU, which are user engagement metrics that Twitter had shared with analysts and investors since it went public. CFO Noto announced that timeline views-per-MAU was up 3%, surpassing the previously guided flat growth.

“Timeline views increased to 180 billion, up 23% from the year-ago quarter. And timeline views-per-MAU totaled 631, up 3% year over year, and better than our outlook for Timeline-views-per-MAU to be flat versus Q4 2013. As we announced in November, we do not intend to disclose timeline views for any future periods.”

Id., p. 6.

37. On the conference call, management reiterated an announcement made on Analyst Day, that going forward it would not provide investors with timeline-related metrics for any future periods because of new product changes.⁴¹ These new product changes no longer required a user to refresh his or her timeline views, making these metrics less relevant, according to management.⁴²
38. As the Company would no longer be disclosing timeline-related metrics, RBC analyst Mark Mahaney asked how analysts and investors should track user engagement.⁴³ In responding to the question, CFO Noto referenced the DAU/MAU ratio and provided an update on the DAU/MAU ratio across different markets.

⁴¹ “Twitter, Inc. Analyst Day,” *Factset:callstreet*, corrected transcript, 12 November 2014, p. 112.

⁴² “Q4 2014 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 5 February 2015, 5:00 PM, p. 8.

⁴³ *Id.*, p. 8.

“[Anthony Noto - CFO]: ... And while that is a long-term goal of ours, to become a daily product, today we have great variance in DAU to MAU across geographies. In our more mature markets, we have very high DAU to MAU, 50% plus. In the emerging markets, we have very low DAU to MAU, at 20% range. They all migrate up to a higher rate over time.”

“Q4 2014 Twitter Inc Earnings Call,” Thomson Reuters, conference call, 5 February 2015, 5:00 PM, p. 8.

39. Analysts concluded that “improvements in engagements and pricing” more than offset slower MAU growth.⁴⁴ Analysts viewed the reacceleration of MAU adds as a positive.

“While MAU growth was light due to a glitch in a software integration rollout, engagement was up vs. our expectations of flat and cons. of slightly down. Importantly, management noted that user growth re-accelerated in January with net adds on a trajectory of 13-16M in 1Q:15. A few more quarters of strong execution like this should reposition Twitter and make it a core holding within the group rather than a trading stock, in our view. We’re reiterating a BUY rating and increasing our PT to \$62 from \$58.”

“Strong 4Q:14 as Ad Demand Continues to Outstrip Supply on Platform; Reiterate BUY,” by Youssef Squali, et al., Cantor Fitzgerald, analyst report, 6 February 2015, p. 1.

“Engagement is improving as new products launch. We are encouraged with management’s commentary suggesting that 1Q net user additions are tracking closely with those of 1Q14 (where MAU grew 14M), and that excludes potential upside from new product launches.”

“Advertising Revenue Grew 97%; Upbeat MAU Outlook; Reiterate Market Outperform Rating & Raise Price Target to \$52,” by Ronald Josey, et al., JMP Securities, analyst report, 6 February 2015, p. 1.

“The Bottom Line – It was a good night for TWTR. The company posted better than expected financials (top and bottom line), solid guidance, and indicated that user growth was returning in 1Q. With improving user metrics, lots of room to run on monetization (as shown by FB), and many, many opportunities to improve the product, we think that TWTR is well positioned to see momentum in its business continue.”

⁴⁴ “Poor Sentiment Amplifies Strong Engagement and Pricing,” by Tony Wible and Murali Sankar, Janney Capital Markets, analyst report, 6 February 2015, p. 1.

“4Q: TWTR’s Positive Surprise,” by Ben Schachter, et al., Macquarie Research, analyst report, 6 February 2015, p. 1.

“TWTR: MAU Growth about to Pick Up as Engagement Rate Improves – Raising PT to \$65 ... MAU growth decelerated a bit but engagement rate growth accelerated while monetization (AR/1K TLV) decelerated.”

“TWTR: MAU Growth about to Pick Up as Engagement Rate Improves – Raising PT to \$65,” by Shelby Seyrafi, FBN Securities, analyst report, 7 February 2015, p. 1.

“We take the intrinsically high levels of Twitter’s Revenue growth as a sign of its traction with advertisers, and are pleased with the modestly increased Y/Y engagement, but the deceleration of Users remain a concern for future growth.”

“#Strengtheningthecore,” by Mark Mahaney, et al., RBC Capital Markets, analyst report, 6 February 2015, p. 4.

“TWTR’s numbers reflect our thesis in that slower MAU growth is more than offset by improvements in engagement and pricing. ... We maintain our Buy rating and increase estimates.”

“Poor Sentiment Amplifies Strong Engagement and Pricing,” by Tony Wible and Murali Sankar, Janney Capital Markets, analyst report, 6 February 2015, p. 1.

“We will be closely tracking the success of recent product enhancements by the company, since these could provide further upside potential to the company’s financial performance by spurring user engagement metrics on the platform. On the other hand, if user base growth continues to underperform in the coming quarters, then it would raise serious concerns regarding the company’s growth model (in our view).”

“Twitter Outperforms During Fourth Quarter, Driving Stock Price Higher,” Trefis, analyst report, 9 February 2015, p. 1.

3. 28 April 2015: Selerity Pre-Releases Selected Q1 2015 Financial Results for Twitter; The Company Announces Q1 2015 Financial Results

40. At 3:07 PM on 28 April 2015, a financial technology company, Selerity, pre-released certain discovered Q1 2015 financial results for Twitter that were scheduled to be

announced by the Company after the close of trading that day.⁴⁵ Selerity published a series of tweets that disclosed Twitter's Q1 2015 revenue, Non-GAAP EPS, MAU, and Mobile MAU.⁴⁶ Specifically, Selerity published the following:

**"#BREAKING: Twitter \$TWTR Q1 Revenue misses estimates, \$436M vs. \$456.52M expected."
Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.**

**"#BREAKING: Twitter \$TWTR Q1 Average Monthly Active Users (MAUs) 302M inline with expectations."
Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.**

**"#BREAKING: Twitter \$TWTR Q1 Mobile Monthly Active Users (MAUs) misses estimates, 241.6M vs. 243M expected."
Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.**

**"#BREAKING: Twitter Inc. \$TWTR Q1 Non-GAAP EPS beats estimates, \$0.07 vs. \$0.04 expected."
Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.**

**"Today's \$TWTR earnings release was sourced from Twitter's Investor Relations website investor.twitterinc.com. No leak. No hack."
Selerity (@Selerity), Tweet, 28 April 2015, 3:34 PM.**

41. News media reported the early financial results and user metric data, noting that Selerity had a history of providing reliable financial results prior to their scheduled release.

⁴⁵ Selerity describes itself as a "real-time search and breaking news platform" that uses "proprietary A.I. to deliver content and data solutions designed to automate inefficient workflows in finance." See, www.seleritycorp.com/about.html.

⁴⁶ "Twitter Shares Tumble After Apparent Earnings Leak – On Twitter," by Erik Holm, *Dow Jones Newswires*, 28 April 2015, 3:39 PM.

42. Once the Company discovered that its Q1 2015 results were public, Twitter asked the NYSE to halt trading.⁴⁷ According to Trade and Quote (“TAQ”) data, trading in Twitter’s common stock was halted from 3:27 PM to 3:47 PM.
43. During the trading halt, at 3:36 PM that day, the Company officially released its financial results for Q1 2015.^{48,49} For the first quarter, the Company reported revenue of \$436 million, which was below consensus estimates of \$456 million,⁵⁰ and below its previously guided range of \$440-\$450 million.⁵¹ The Company established Q2 2015 revenue guidance in the range of \$470-\$485 million (below consensus estimate of \$538 million). The Company also reduced its FY 2015 revenue guidance range to \$2.17-\$2.27 billion from \$2.30-\$2.35 billion (below consensus estimate of \$2.37 billion).⁵²
44. The Company reported that it finished Q1 2015 with 302 million MAUs (meeting the consensus estimate of 302 million MAU), an increase of 14 million users over the previous quarter.⁵³
45. Before the conference call, RBC analyst Mark Mahaney commented on the surprising “miss and lower results.”

⁴⁷ “The tweets that made Twitter stock crash; Selerity says Twitter’s news was released, not leaked or hacked,” *MarketWatch*, 28 April 2015, 5:23 PM.

⁴⁸ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 April 2015, 3:36 PM.

⁴⁹ I noted in my February Report, that certain of the Company’s Q1 2015 financial results were leaked prior to the close of trading on 28 April 2015 (at 3:07 PM), and trading was halted shortly thereafter (at 3:27 PM) for the Company to release its full Q1 2015 financial results. *See*, Feinstein Report, ¶100 n.40-41, and ¶120 n.55-56. In the Feinstein Report I tested 29 April 2015, the next trading date, as the event date for the Twitter stock price reaction to the new earnings information. I understand that the 28 April 2015 trading halt concluded at or around 3:47 PM, giving market participants approximately 13 minutes on 28 April 2015 to interpret, evaluate, and trade shares of Twitter stock to reflect their understanding of the earnings news. To note, the Company’s conference call to discuss the Q1 2015 earnings occurred after the close of trading on 28 April 2015. Given the timing of the Company’s financial results release, both 28 April 2015 and 29 April 2015 are appropriate event candidates for a study of market efficiency, as one would *ex ante* expect some market reaction to the earnings information on both dates. As explained in the Feinstein Report, the Twitter stock price return was statistically significant on both 28 April 2015 and 29 April 2015. *See*, Feinstein Report, ¶¶120-122 and Exhibit-6. Both event dates support a finding of market efficiency.

⁵⁰ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 April 2015. Consensus estimates obtained from FactSet.

⁵¹ *Id.*

⁵² *Id.*

⁵³ *Id.*

“In the wake of an upbeat Investor Day last November and positive commentary from both the Q4 EPS results and intra-quarter public conferences, these Miss & Lower results are very surprising. Raises the question of how much visibility into advertiser and consumer demand for its offerings Twitter really has. ... Our overall investment concerns remain. First, it’s not clear that the company’s substantial product changes can reaccelerate its User & Usage metrics.”

“Twitter Reported Q1 EPS Before The Close Of The Market,” by Mark Mahaney, RBC Capital Markets, analyst report, 28 April 2015, 4:18 PM, p. 1.

4. 29 April 2015: Twitter Holds Earnings Conference Call

46. On 28 April 2015, after the close of trading, Twitter held a conference call with investors to discuss its Q1 2015 financial results and outlook.⁵⁴ During the conference call, CFO Noto attributed the lower than expected Q1 revenue to transient factors including, its “raising the bar on what constitutes an engagement or a click.”⁵⁵ While the lower revenue effect of the transient factors would persist into the second quarter, the Company expected that the higher ROI that advertisers would get as a result of this change would lead to an improvement in revenue in 2H 2015.⁵⁶
47. During the conference call, investors asked CFO Noto about Q2 MAU growth. He stated that the Company had limited visibility into Q2 MAU growth, however, he did note that the Q2 MAU trend to date was not similar to the strong Q1 MAU trend.

“[Anthony Noto – CFO]: In MAUs, the 302 million monthly active users that we reported without SMS follows in Q1 was driven by growth initiatives and a return to organic and seasonal growth and we had the benefit of all those factors working for us as we delivered that number. In Q2, we’re not seeing the benefit from those three factors as much and

⁵⁴ Id.; Twitter Q1 2015 Earnings Follow-Up Call, [TWTR_SHEN_00118995-9018].

⁵⁵ “Q1 2015 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM, p. 6.

⁵⁶ Id.

there's also some headwinds. *At this point, our visibility is actually limited as it relates to Q2 MAU ads* [sic]. We're off to a slow start in April and so the visibility is not as strong as it was in Q1 and the trend is not similar to Q1."

"Q1 2015 Twitter Inc Earnings Call," *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM, p. 10 (emphasis added).

48. Given the importance of user engagement to the valuation of Twitter, analysts again asked the Company for metrics that could be used to monitor user engagement. CFO Noto reassured analysts that the Q1 2015 DAU/MAU ratios "were similar to what they were by market relative to Analyst Day."

"[Anthony Noto – CFO]: In terms of engagement metrics, there's a lot of different metrics that we look at internally. There's not one metric for engagement. And so I can give you a sense of some of them and quite frankly, we would like to be able to give you more visibility on this, but there's just a number of different measurements. *DAU is one measurement of engagement. We talked about that at Analyst Day.* It's a measurement that is dependent by market and you could have a mix shift so that could be a little bit misleading, *but DAU to MAU ratios in the quarter were similar to what they were by market relative to Analyst Day.* Other engagement metrics that we look at are tweets per day, favorites and retweets, direct messages, searches. Our number of searches actually accelerated on a year-over-year growth basis in the quarter. Direct messages also accelerated on a year-over-year basis in the quarter. Favorite and retweets had strong growth and we had growth in tweets per day, as well. *Those metrics all were generally positive.* The timeline view metric, we don't look at internally. It is a metric that we're doing things that actually hurt it, and that was one of the reasons why we eliminated it. We continue to look for metrics that could be helpful to you and we will try to give you color from time to time across these different metrics, but there's not one be all and end all metric."

Id., p. 17 (emphasis added).

49. Analysts commented on the lack of visibility into Q2 MAU Growth. Barclays published a report titled “Rough Quarter, Outlook Disappoints,” in which they noted that “commentary from the conference call implied MAU trends were soft heading into Q2.”⁵⁷ RBC analysts stated that the results raised “the question of how much visibility into consumer and advertiser demand for its offerings Twitter really has. Management will also again have to address credibility issues.”⁵⁸ Other analysts commented similarly:

“We typically shy away from ratings changes on earnings, particularly after meaningful one-day moves in the stock, however we are downgrading Twitter to EW on the back of missed Q1 expectations and disappointing 2Q guidance. We are struggling to find any silver linings in the results as MAU growth met expectations while total revenue, advertising revenue and EBITDA all missed forecasts and were guided below Street expectations for Q2.”

“Rough Quarter, Outlook Disappoints,” by Paul Vogel, et al., Barclays, analyst report, 29 April 2015, p. 1.

“Maintain Sector Perform...But Incrementally More Cautious – These Miss & Lower results are surprising. Raises the question of how much visibility into consumer and advertiser demand for its offerings Twitter really has. Management will also again have to address credibility issues.”

“Twitter Dropping...,” by Mark Mahaney, et al., RBC Capital Markets, analyst report, 28 April 2015, p. 1.

“In the Q1 earnings print, Twitter management unwound much of the positive goodwill that had been built up from the prior quarter – forward user commentary was noncommittal & weaker-than-expected monetization of direct-response ad units led to a full year revenue guidedown. That said,

⁵⁷ “Rough Quarter, Outlook Disappoints,” by Paul Vogel, et al., Barclays, analyst report, 29 April 2015, p. 1.

⁵⁸ “Twitter Dropping...,” by Mark Mahaney, et al., RBC Capital Markets, analyst report, 28 April 2015, p. 1.

we continue to point to Twitter as a growing & important digital advertising buy in the ad ecosystem (2nd largest monetizing social media property *with engaged users*).

“Searching for Two Steps Forward,” by Eric Sheridan, et al., UBS, analyst report, 28 April 2015, p. 1 (emphasis added).

“Our broad concerns remain two-fold. First, it’s not clear that the company’s substantial product changes can reaccelerate its User & Usage metrics. And mgmt’s cautious commentary about Q2 MAU growth compounds doubts about Twitter’s user value proposition.”

“Twitter Dropping...,” by Mark Mahaney, et al., RBC Capital Markets, analyst report, 28 April 2015, p. 1.

“MAUs in line in Q1, but concerns about reach of the platform should persist. Twitter added 14 million MAUs in Q1 due to growth initiatives and a return to organic and seasonal growth, although the company is not expected to benefit from those factors in Q2 and has struggled to add MAUs through April. Although the company should be able to expand its reach with logged-out and third-party users, we see the Q2 MAU weakness and inability to drive volumes for some advertisers as linked issues that are likely to persist.”

“Early Bird Results Disappoint,” by Blake Harper, Wunderlich, analyst report, 29 April 2015, p. 1.

50. Despite the Company’s lack of visibility into MAU growth in Q2 2015, analysts were reassured by CFO Noto’s comments regarding user engagement, specifically that the DAU/MAU ratio was similar to that announced at Analyst Day (48%).

“Engagement Trends Twitter no longer discloses Timeline Views/MAU, the company’s former self-defined measure of user engagement. As a result, it will be more challenging to track whether engagement levels are rising or falling at the company. However, management stated that the DAU/MAU ratio is similar to where it was at the Analyst Day last November. Further, the company said that Searches and Direct Messages accelerated in the quarter, with Favorites and Re-Tweets showing ‘strong growth.’ So qualitatively, it doesn’t appear that there was any degradation in Twitter’s engagement metrics.”

“Twitter Dropping...,” by Mark Mahaney, et al., RBC Capital Markets, analyst report, 28 April 2015, p. 3.

“We generally agree that TLVs did not really tell the whole story in terms of usage and engagement, but at least for now Twitter does not have a new or substitute metric to gauge usage performance. ... Even though MAUs don’t tell the whole story, we still expect Twitter to report MAUs for the foreseeable future, even as TLVs are replaced as a usage metric. Given that, we would also like to see Twitter report DAUs (Daily Active Users) on a regular basis at some point, e.g., the only comment for 1Q15 DAUs was that they were similar in terms of geographic mix as of late last year. Twitter had indicated late last year that the DAU/MAU ratio was in a low 50s percent to high 40s percent range for its top 5-20 geographic markets. As with Facebook, which reports DAUs and MAUs in total and specifically for mobile, we think DAU/MAU would be a proxy for usage and engagement frequency.”

“Downgrading to Neutral; Limited Execution in Key Areas,” by Martin Pyykkonen, Rosenblatt Securities, analyst report, 29 April 2015, pp. 1, 2.

“The company noted that engagement (as measured by DAU/MAU) remained stable in 1Q and the early impact from new product features such as ‘While you were away’ and instant timeline is positive.”

“Euphoria Back To Despair, But LT Story Intact,” by Ross Sandler, et al., Deutsche Bank, analyst report, 29 April 2015, p. 1.

51. Following the Company’s Q1 earnings release and conference call, several analysts reduced their price targets and valuation multiples, citing poor revenue and user growth.

“While we think most of the advertiser-related issues are temporary, the most negative aspect of the quarter in our view was the ‘low visibility’ regarding Q2 (& beyond?) MAU growth. This could temper enthusiasm for the stock until corrected, or investors get comfortable with long-term growth driven solely by monetization improvements. ... We lower our price target from \$56 to \$52, based on 35x (down from 40x) our lower 2018 non-GAAP EPS estimate of \$2.00 (down from \$2.02), discounted to present at ~10%.”

“Mixed Q1 with Tempered Outlook but Thesis Still Intact,” by Michael Graham and Austin Moldow, Canaccord Genuity, analyst report, 28 April 2015, p. 1.

“We are downgrading our rating on Twitter from Buy to Neutral and revising our price target downward from \$60 to \$42, based on ~25x our

adjusted EBITDA estimate of ~\$900 million for full year 2016. ... Twitter reported 1Q15 results that missed revenue consensus and beat EBITDA and EPS consensus. The 1Q15 release came out prematurely, and further comments on the quarter and outlook were clearly disappointing. On the surface, Twitter's 1Q15 total revenue shortfall of \$436 million (vs. \$457 million consensus) was largely due to foreign exchange headwinds in 1Q15, but there were other more fundamental issues after looking into the quarterly details.

The key reasons for our rating downgrade on the stock include:

- 'User' growth lackluster at best in the near term (at least for 2015)
- Lack of 'usage' metrics (TLVs discontinued) suggests audience growth Issues
- Advertising demand uncertainty, e.g., maybe losing share vs. other digital media"

"Downgrading to Neutral; Limited Execution in Key Areas," by Martin Pyykkonen, Rosenblatt Securities, analyst report, 29 April 2015, p. 1.

"Estimate Changes and Valuation: Our CY15 revenue/EBITDA estimates move to \$2.17B/\$514M, respectively (prior \$2.5B/\$594M). Our old Price target of \$60 was based on an EV that was 9x our previous CY15 [*sic*] sales of \$3.9B. Our new Price target of \$44 represents an EV that is 8x our CY16 sales of \$3.14B."⁵⁹

"Rough Quarter, Outlook Disappoints," by Paul Vogel, et al., Barclays, analyst report, 29 April 2015, p. 1.

"Valuation Range: \$42.00 to \$44.00 from \$48.00 to \$50.00 Our valuation range reflects a 32.6x EV-to-EBITDA multiple on our 2016 EBITDA estimate of \$864 million."⁶⁰

"TWTR: Uneven Ad Demand Adds to User Challenges," by Peter Stabler, et al., Wells Fargo, analyst report, 29 April 2015, p. 1.

⁵⁹ It appears that "our previous *CY15* sales of \$3.9B" in the 29 April 2015 Barclays report contains a typographical error and, consistent with the Barclays analysts' prior reports, should read "our previous *CY16* Sales of \$3.9B" Adjusting for this apparent typographical error, the Barclays analyst reduced their valuation multiple following the Q1 2015 earnings release and conference call. *See, previously* "Our CY15 revenue/EBITDA estimates move to \$2.5B/\$594M, respectively (prior \$2.28B/\$533.7M). Our price target of \$60 represents an EV that is 9x our CY16 Sales of \$3.9B." ("My Tweets are Moving," by Paul Vogel, et al., Barclays, analyst report, 6 February 2015, p. 1.)

⁶⁰ *See, previously*: "Our valuation range reflects a 36.0x EV-to-EBITDA multiple on our 2016 EBITDA estimate of \$893 million." ("MAU Concerns Easing – Ad Demand Strong," by Peter Stabler and Steve Cho, Wells Fargo, analyst report, 6 February 2015, p. 1.)

5. 11 June 2015: Twitter CEO Resigns

52. On 11 June 2015, Twitter issued a press release announcing that Dick Costolo would step down as the Chief Executive Officer of Twitter and would be replaced by Co-Founder and Chairman Jack Dorsey, effective 1 July 2015. The Company reaffirmed its outlook for Q2 2015.⁶¹

6. 29 July 2015: Twitter Announces Q2 2015 Financial Results

53. On 28 July 2015, after the close of trading, the Company announced its financial results for Q2 2015 and held a conference call with investors.⁶² For the second quarter, the Company reported revenue of \$502 million, which was above the consensus estimate of \$482 million⁶³ and above the Company's previously guided range of \$470-\$485 million.⁶⁴
54. The Company established Q3 2015 revenue guidance at \$545-\$560 million (the midpoint of which is below consensus estimates of \$556 million), and increased the lower end of the revenue guidance range for FY 2015 so that the range would be \$2.20-\$2.27 billion, up from a range of \$2.17-\$2.27 billion.⁶⁵ The \$2.235 billion midpoint of the new guidance range was \$15 million above the old range midpoint, and exceeded the prior consensus estimate of \$2.2 billion.
55. The Company reported that it finished Q2 2015 with 304 million MAU, excluding SMS Fast Followers, a net increase of 2 million over Q1 2015.⁶⁶
56. On the conference call, the Company declared that its recent product initiatives were not having any impact on user growth or user engagement levels.⁶⁷ The Company reported that the DAU/MAU ratio for Twitter's top 20 markets had fallen from an average of 48%

⁶¹ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 11 June 2015.

⁶² Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 July 2015; and "Q2 2015 Twitter Inc Earnings Call," *Thomson Reuters*, conference call, 28 July 2015, 5:00 PM; Twitter Q2 2015 Earnings Follow-Up Call, [TWTR_SHEN_00096943-64].

⁶³ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 July 2015. Consensus estimates obtained from FactSet.

⁶⁴ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 July 2015.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ "Q2 2015 Twitter Inc Earnings Call," *Thomson Reuters*, conference call, 28 July 2015, 5:00 PM, p. 3.

during the first three quarters of 2014 to 44% in Q2 2015.⁶⁸ Management stated that they expected organic user growth to remain low in the near term.⁶⁹

“To be clear, however, we do not expect to see sustained meaningful growth in MAUs until we start to reach the mass market. We expect that will take a considerable period of time.”

“Q2 2015 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 28 July 2015, 5:00 PM, p. 5.

“As it relates to the MAU to DAU ratio and other factors, what I’d say is the DAU to MAU ratio has gone down over the time period that I articulated because we’ve grown MAUs faster than DAUs and we have not historically focused on driving daily active user growth. And that something, in 2016, that we will consider more. As it relates to MAU trends in the third quarter, listen, we wanted to give you a very clear articulation of the opportunity we have in front of us. It’s an opportunity to close the gap between penetration at less than 30% and awareness at 95%.”

Id., p. 14.

57. Despite the better than expected financial results, analyst commentary was focused on the declining user engagement and disappointing user growth outlook.

“Question marks around company’s ability to drive sustainable user growth: Consistent commentary around the inability to break into the ‘mass market’ makes us wary of TWTR’s addressable audience, and the question marks around the company’s ability to drive future user net adds are unlikely to go away in the near-term. Twitter has yet to prove itself as a platform that can drive continuous (daily) engagement and usage.”

“Fewer Birds: Price Target to \$36,” by Brian Nowak, et al., *Morgan Stanley*, analyst report, 29 July 2015, p. 3.

“Initial enthusiasm behind a solid revenue and EBITDA beat quickly evaporated as CEO, Jack Dorsey and CFO, Anthony Noto offered a surprisingly blunt and candid assessment of Twitter’s near-term user growth prospects, revealing that recent efforts such as Instant Timeline and curated

⁶⁸ Id., p. 5.

⁶⁹ Id., p. 14.

Logged Off experiences have failed to ignite user growth or participation rates. Consequently, we lower our ests for MAU (monthly active user) growth for '15, with a flow-through to '16. ... Clear evidence was offered when CFO Noto revealed to investors that Twitter's DAU/MAU ratio had declined to 44% in the quarter from the 48% figure (for the first 3 quarters of 2014). The DAU/MAU ratio is highly important as daily engagement is a key ingredient in driving advertising impression growth (along with MAU and ad-load growth)."

"TWTR: No Easy Fix To User Growth Issue," by Peter Stabler, et al., Wells Fargo, analyst report, 29 July 2015, pp. 1-2.

"The most salient element of this evening's report was the self-criticism of recent user growth by interim CEO Dorsey and the follow-up caution from CFO Noto that the trajectory (~2-3mm new MAUs per quarter) is not expected to change soon. While the optimist in us applauds the frankness, the realist also sees the expectations bar being reset for the soon-to-be-incoming new CEO. We've heeded the caution and eased off MAU growth expectations materially. And since user growth remains (by far) the most important support mechanism for the multiple, further contraction is expected."

"Bar Reset on User Growth Expectations," by Daniel Salmon, et al., BMO Capital Markets, analyst report, 29 July 2015, p. 1.

"By themselves, monetization improvements (including rising ad loads) can't sustain premium growth rates. That's why MAU growth matters. That's why User and Usage metrics matter. And that's why hitting Metrics Growth Walls REALLY MATTERS..."

"TWTR Has Hit A Wall...," by Mark Mahaney, et al., RBC Capital Markets, analyst report, 28 July 2015, p. 1.

58. Despite the fact that the Company "did post a financial beat and slightly raised its FY guidance,"⁷⁰ analysts reduced their price targets and valuations, citing the Company's poor growth trajectory in user base and user engagement.

⁷⁰ "Fading Fast Followers; Reiterate Hold and Retain Negative Bias," by Scott W. Devitt, et al., Stifel, analyst report, 28 July 2015, p. 1.

“TWTR reported good 2Q15 financial results, but user issues persist. Mgmt. noted limited user growth could persist for an extended period of time given mass adoption issues, potentially impacting forward revenue growth as it could limit ad inventory growth. We lowered long-term estimates, which were ~10% below street pre-print. Maintain Market Perform; lowering Price Target to \$30 from prior \$34.”

“2Q15 Results: Good Financial Results, User Issues Concerning,” by John Blackledge, et al., Cowen and Company, analyst report, 29 July 2015, p. 1.

“User Growth Stagnates and Revenue Growth May Soon Follow: ... While the company did post a financial beat and slightly raised its FY guidance, the company highlighted that it may begin to see days where its revenue is affected by a lack of inventory in which to place ads. In our opinion, this is an alarming fast-forward of our overarching longer-term bear thesis on the company. ... We are tweaking our near-term estimates but reducing our long-term estimates given the continued issues growing users and increasing possibility that ad revenue follows suit. We are lowering our fair value from \$36 to \$32.”

“Fading Fast Followers; Reiterate Hold and Retain Negative Bias,” By Scott Devitt, et al., Stifel, analyst report, 28 July 2015, [TWTR_SHEN_00005288-97, at 88].

“User Growth, Engagement & Ad Load Trends Cited as Potential Concerns Although the financial performance was better, prepared remarks by CFO Noto not to expect meaningful user growth until Twitter delivers a more mass market experience, now expected ‘to take a considerable period of time’, along with commentary on diminished user engagement and ad load constraints sent shares into a reversal. While the better financial performance was driven by improvement in the transition to performance marketing and healthier ad auction dynamics, since so much of our terminal is based on leading growth drivers, specifically user growth, we are in fact taking these long-term comments to heart and reducing our ‘16 and ‘17 estimates despite a modestly higher FY guide. As such, our target moves to \$35 from \$39.”

“Waiting for (Project) Lightning to Strike,” by Ken Sena, et al., Evercore, analyst report, 28 July 2015, p. 1.

“Our price target falls from \$44 to \$37 for two related reasons:

- Twitter’s user growth and user growth outlook came in below expectations and calls into greater question the ability of the company to sustain elevated revenue growth on a multi-year basis.

- We are lowering our target multiple from 32x EV/EBITDA to 29x to account for the reduction in EBITDA growth over a 3-year horizon.”
“MAUs Losing Altitude,” by Mark May and Ryan Ripp, Citi, analyst report, 28 July 2015, [TWTR_SHEN_00005061-70, at 64].

“Est Changes; Reiterate Market Perform; Target Price to \$30 from \$34
We lowered our LT outlook (see table), Price target to \$30 (from \$34). As for our thesis, we have been cautious on TWTR given MAU / engagement concerns. While monetization has been solid, this quarter’s MAU commentary and lack of guide are concerning. There was little update on the off-TWTR and logged out user opportunity, but this could be beneficial longer-term as could ‘Project Lightning’ (curated relevant feeds). We remain cautious on TWTR as they work through user issues.”

“2Q15 Results: Good Financial Results, User Issues Concerning,” by John Blackledge, et al., Cowen, analyst report, 29 July 2015, p. 1.

“We’ve heeded the caution and eased off MAU growth expectations materially. And since user growth remains (by far) the most important support mechanism for the multiple, further contraction is expected. ... We are lowering our price target to \$34 from \$42. Our 2016 estimates ease off slightly, but we are also lowering our target multiple in light of the cautious comments for near-term user growth. Our new \$34 target implies a 22.2x 2016 EV/EBITDA, which compares with FB at 20.3x and LNKD at 25.2x. We maintain our Market Perform rating on TWTR stock.”

“Bar Reset on User Growth Expectations,” by Daniel Salmon, et al., BMO, analyst report, 29 July 2015, p. 1.

“Slightly raising 2015, but lowering out years due to MAUs Revenue growth continues to perform well vs estimates, and we are slightly raising our 2015 rev/EBITDA estimates to \$2.24bn/5554mn from 52.22bn/5543mn. Our estimates include a benefit from the TellApart acquisition of \$12mn in 3Q and \$39mn for 2015. However, we are lowering 2016E and 2017E revenue by 2% and 5%, respectively, to reflect lower out year MAU estimates.”

“2Q Beat, But Still Hasn’t Cracked The User Code; Neutral,” by Justin Post and Joyce Tran, Bank of America Merrill Lynch, analyst report, 29 July 2015, [TWTR_SHEN_00005149-60, at 49].

“Twitter is trading at more than 13 times NTM sales. Without user growth, it is hard to see the stock working, no matter what ARPU and margins do. User growth was anemic this quarter and management commentary on the user trajectory was horrendous.”

“Twitter 2Q15 Review: Stock Won’t Work If Users Don’t Grow,” by Carlos Kirjner, et al., Bernstein, analyst report, 29 July 2015, [TWTR_SHEN_00005174-85, at 74].

“Engagement is not improving. The ratio of DAUs to MAUs dropped to 44% (vs. 48% in 3Q14), making it difficult to make the case that engagement of the existing user base has improved. This ratio is a very imperfect metric for user engagement, but, if anything, it points to declining user engagement. This decline in the ratio of DAUs to MAUs, in addition to Twitters’ weak user growth and the CFO’s negative comments on the prospects of user reacceleration suggest Twitter is not on track to reach its stated objective to become “the largest daily audience in the world,” an objective repeated nearly ten times by management during Twitter’s analyst day.”

“Twitter 2Q15 Review: Stock Won’t Work If Users Don’t Grow,” by Carlos Kirjner, et al., Bernstein, analyst report, 29 July 2015, [TWTR_SHEN_00005174-85, at 75].

“We have adjusted the user growth trajectory and now estimate that, by 2018, Twitter will get to 346 million global MAUs, well below our previous estimate of 386 million. Our 2018 EBITDA estimate has also dropped significantly, to \$1.60 billion (from \$1.73 billion), as did the expected 2018 EBITDA growth rate. We expect EBITDA to be growing 32% in 2018. As a result, we now set our 12 month price target based on a 15 times 2018 EBITDA (20 times a year before), to get a valuation of \$33/share, assuming 710 million diluted shares a year out.”

“Twitter 2Q15 Review: Stock Won’t Work If Users Don’t Grow,” by Carlos Kirjner, et al., Bernstein, analyst report, 29 July 2015, [TWTR_SHEN_00005174-85, at 76].

“Our FY16 rev./adj EBITDA estimates go to \$3.27bn/\$870m from \$3.41bn/\$1.02bn as weaker user trends impact revenue growth, which drops to the bottom line. Our EV/EBITDA multiple goes to 24x from 30x, reflecting the company’s reduced growth prospects.”

“Weak MAUs Raises Growth Sustainability Concerns,” by James Cordwell, Atlantic Equities, analyst report, 29 July 2015, [TWTR_SHEN_00005123-29, at 23].

“Our adjusted EBITDA margin estimates are 23.7% for full year 2015 and 29.6% for full year 2016. The company’s long term target model is 35%+ adjusted EBITDA margin, but we think that will require substantial usage growth (especially from more casual users) to be monetized with targeted and brand advertising. Our key fundamental focus for Twitter continues to be the interplay between MAUs and ad revenue monetization. Until last quarter, Twitter had actually executed better at driving per unit of usage (previously timeline views – TLVs) than it had at driving MAU growth. Twitter beat ad revenue expectations for 2Q15, but MAUs on a normalized basis (excluding SMS fast-followers, e.g. feature phone mobile users) were up only modestly. Twitter’s DAU/MAU ratio in its top 20 markets was ~40%, which indicates some deceleration in usage (vs. ~48% for the first nine months of last year). While TLVs were not a perfect usage metric, it at least gave some indication of usage/engagement performance, which we continue to think is relatively more important than just basic user (MAU) growth.”

“Still Searching For Mass Market Appeal and Usage,” by Martin Pyykkonen, Rosenblatt Securities, analyst report, 29 July 2015, [TWTR_SHEN_00005283-87, at 83-84].

“Model and Target Price changes. Given 20’s better-than-anticipated monetization trajectory and the inclusion of TellApart, we are slightly raising our FY15E forecast, in line with guidance. However, the persistence of tepid user growth leads to a more meaningful reduction to our FY16E and 17E estimates. As result, we reduce our target price to \$33 from \$39 based on our discounted 2017E EPS estimate of \$1.08 and a 35x multiple.”

“Bluebird Sings the MAU Blues; TP to \$33,” by Anthony DiClemente and Kevin Rippey, Nomura, analyst report, 29 July 2015, [TWTR_SHEN_00005236-45, at 36].

7. 30 July 2015 Through 3 August 2015: Market Participants Assess the Consequences of Company’s Disclosures to the Valuation of Twitter’s Stock

59. Twitter’s share price declined over the next several days following its Q2 2015 earnings announcement, as the news media, analysts, and market continued to assess the impact of declining engagement levels and in turn slowing user growth. On August 3rd, *Business Insider* published an article characterizing Twitter’s user base as possibly deteriorating, and explained the impact of user engagement on user growth, highlighting the importance

of “re-engagement.”⁷¹ The article explained the importance of adding “good” active MAUs to the population of MAUs, and the importance of user retention. Since MAU net adds are composed of new accounts that are registered every month, less churn (loss) from existing accounts, if user experience is not improved, it would likely result in churn exceeding the new users being added, resulting in an overall decrease in the number of MAUs. Similarly, growing MAUs by adding “bad” quality MAUs would not increase revenue proportionally, since “bad” MAUs with poor engagement would not monetize as well as the “good” MAUs.

“There is a possibility that the quality of MAUs is deteriorating, which will immediately impact the effectiveness of monetization efforts, and the potential revenue per user. There is also a risk that MAUs will start to decline, because of the fact that relatively ‘good’ MAUs are being replaced by relatively ‘bad’ MAUs. It is understandable that Twitter is putting great effort in further monetization, but it may be even more important that the user experience improves, so the massive pool of existing, but inactive accounts can be re-engaged.”

“There Is A Possibility That The Quality Of Twitter’s Users Is Deteriorating,” by Adrianus Wagemakers, *Business Insider*, 3 August 2015, 6:45 AM.

60. News media attributed the stock price slide in the days following the Q2 2015 earnings announcement to the poor user growth outlook disclosed by the Company. *The Wall Street Journal* quoted an analyst report that came out on August 3rd in which Twitter user (growth) was modelled flat.

“Shares of Twitter Inc. (TWTR) touched a record low on Monday, weighed down by negative comments from the micro-blogging site’s executives on its user growth.”

“Twitter Shares Hit Record Low Amid Growth Concerns,” *RTT News*, 4 August 2015.

“The biggest issue, though, and the one that’s triggered the latest selloff, is the stagnation in the service’s user base. In its latest quarterly report, the company said it had 304 million core users, virtually unchanged from the

⁷¹ “There Is A Possibility That The Quality Of Twitter’s Users Is Deteriorating,” by Adrianus Wagemakers, *Business Insider*, 3 August 2015, 6:45 AM.

302 million it reported in the first quarter. Even Mr. Dorsey called the numbers ‘unacceptable,’ and his displeasure sparked a selloff. ‘On the IPO Twitter looked like a world beater,’ Albert Fried analyst Richard Tullo wrote on Monday, ‘today people are reconciling the their 20-year models because guess what no one, not even a grumpy man like me, modeled Twitter users as flat.’”

“Twitter Shares Hit New Low Amid Old Concerns,” by Paul Vigna, *The Wall Street Journal*, 5 August 2015, 1:33 PM.

61. During trading on 3 August 2015, SunTrust analyst Robert Peck was interviewed on CNBC following the Company’s earnings announcement. During the interview Mr. Peck discussed the significance of user engagement and growth to Twitter’s financial success, and that investors should wait until these turn around as they drive the fundamentals of the Company.

“Host: So, by an upturn in Twitter fundamentals I’m assuming the naming of a new CEO would not be enough?

Peck: No, I think you need to see traction on the new products being rolled out and then those products actually resonating with users such that they come back and engage more with the platform, and that would drive the fundamentals going forward.

* * * * *

Host: ...What are the fundamentals as you see them?

Peck: Yeah well, I think users are at the heart, right? You just want to know how big the platform is, how big this can be. Can this be 1 billion people? Or is it a 300 million platform. And then there’s the engagement part of it. How active are these users? So, are they engaging with the tweets, engaging with the products? Or are they not really going there that often? And that ultimately leads to monetization because large groups of users that are engaging you can monetize extremely well. And that’s what will drive the financials going forward.”

Transcribed from <https://www.cnbc.com/video/2015/08/03/twitter-needs-more-than-just-a-new-ceo-analyst.html>

62. The Company attributed the protracted slide in the stock price to its disclosure of disappointing user growth. As CFO Noto wrote in an internal Company email on 3 August 2015:

“Essentially this is what I think is happening we reported on Tuesday. Buyside analysts are developing an initial point of view that they communicate by end of day on wed but say I want to do more work over the coming days and will share more after I have chance to spend more time over the weekend given I have 3 companies reporting a day on Wed and Thursday .. The analyst takes a step back and takes a deeper dive over the weekend and publishes a more thorough view on Sunday night. That note says the following- the core business grew 50-53% not 60%+if Twitter doesn't grow MAUs more than 5-10% in 2015 and 2016 we are looking at 35-40% growth best case in 2016 vs our prior view of 48%-50%+ growth. If it is growing 35-40% growth not sure why I would pay more than 5-6x revenue which is a mid twenties stock. They tell all of their PMs this Sunday night. So PMs say ok I will stall to lighten up my position over the coming days and they start selling a little and as the selling starts to escalate and people panic and try to get out faster as stock breaks \$30 and then \$29 Hence the high volume in trading and the stock breaking through \$30 and then \$29. ...I think the stock settles in at \$25-\$26 which is the same ev/rev/growth multiple we have traded at but now using 35% instead of 48%.”

Internal Company email, 3 August 2015, [TWTR_SHEN_00319909].

63. It is noteworthy that CFO Noto remarked that multiple companies were reporting earnings in close proximity to Twitter's announcement, and the finance literature finds that simultaneous competing earnings announcements can extend the amount of time the market needs to fully incorporate newly announced information.⁷²
64. CFO Noto linked the revaluation of the Company to its altered growth rate. He had previously noted that the stock price would fall if the growth rate decelerated.

“a few people asking me about the stock price today. If you remember the chart I showed staff about 5 weeks in the june forecast deck I showed that once investors realized our growth rate could keep decelerating to about 35-

⁷² “Driven to Distraction: Extraneous Events and Underreaction to Earnings News,” by David Hirshleifer, et al., *The Journal of Finance*, 2009.

40% for 2016 that the stock would keep the ev/rev/growth rate the same but with the lower growth rate could get as low at \$26.”

Internal Company email, 3 August 2015, [TWTR_SHEN_00260922].

65. On 4 August 2015, CFO Noto emailed multiple analysts requesting feedback on Twitter’s stock performance.

“David can you send us some feedback on what you are hearing on our stock (since earnings) that we can share with investors. Separate from technicals I believe the stock is re-rating to a lower growth rate given our core business is slowing and we arent growing users so seeing multiple contraction on back of growth rate expectations coming down.”

Internal Company email, 3 August 2015, [GS_0001377, at 98], See also, [TWTR_SHEN_00105562].

66. In response, Ludwig David, a Goldman Sachs investment banker responded that among other things, “commentary around MAU growth needing time for recovery is continuing to cause significant concern with investors.”⁷³
67. In an email from Barclays director Glenn Carell, on 4 August 2015, CFO Noto was informed that the sales of Twitter stock accelerated after the interview on CNBC with SunTrust analyst Rob Peck.⁷⁴ Rob Peck informed that Twitter fundamentals would have to change. New products being launched by Twitter would have to resonate with users such that they would engage more with the platform driving monetization.⁷⁵
68. On 5 August 2015, Steve Green sent an email to CFO Noto and Interim CEO Jack Dorsey, with feedback from the Company’s Q2 earnings call. He explained that the strategy to provide an “honest reset to give us cover” worked, noting that the Company “took it down to studs.”⁷⁶

⁷³ Internal Company email, 4 August 2015, [GS_0001397].

⁷⁴ Internal Company email, 4 August 2015, [TWTR_SHEN_00230554].

⁷⁵ <https://www.cnbc.com/video/2015/08/03/twitter-needs-more-than-just-a-new-ceo-analyst.html>; [TWTR_SHEN_00230554].

⁷⁶ Internal Company email, 5 August 2015, [TWTR_SHEN_00347125_0002].

IV. LOSS CAUSATION

69. According to the Private Securities Litigation Reform Act of 1995 (“PSLRA 1995”), “the plaintiff shall have the burden of proving that the act or omission of the defendant alleged to violate this chapter caused the loss for which the plaintiff seeks to recover damages.”⁷⁷ This causation is what is meant by loss causation.
70. When addressing loss causation, the empirical behavior of a company’s security following the revelation of the information alleged to have been concealed is important for determining whether the information at issue caused the security price to decline. One typically conducts an event study in order to determine whether such revelatory events were a substantial cause of a stock price decline. An event study focused on residual returns, which exclude and control for the effects of market and sector factors, measures how much a stock price rises or falls in response to new information. An event study is essentially a controlled experiment that allows one to observe the market’s valuation of the stock with and without the information at issue. Prior to a corrective disclosure, the stock is valued in the marketplace without the new information. After the event, the stock is valued with the newly-released information.
71. Once the event study has established a company-specific stock price reaction, one must determine whether the allegation-related information was a substantial cause of the residual stock price decline, after removing the effect, if any, of potentially company-specific non-fraud-related (i.e., confounding) information. Valuation tools can be used to remove the effect of confounding information from the price decline, if any. After controlling for confounding information, if any, one can determine whether the revelation of the concealed facts, including the company’s true financial condition, was a substantial cause of the residual stock price decline.

⁷⁷ Private Securities Litigation Reform Act of 1995, 15 U.S.C. §78u-4.

72. Additional elements of loss causation analysis include examining fundamental valuation principles, company statements, and analysts' commentary in order to assess whether the subject matter of the alleged misrepresentations and omissions is economically material, valuation relevant, and important to investors.⁷⁸
73. Over the course of the Class Period, the alleged misrepresentations and omissions about the Company's poor user growth and user engagement trends and metrics caused the price of Twitter stock to be artificially inflated. When the market learned the truth about the Company's poor user growth and user engagement trends and metrics, its inability to sustain meaningful growth in users, and the financial implications associated therewith, the artificial inflation in the price of Twitter stock dissipated, causing the stock price to fall, and thereby causing investor losses. These conclusions are based on generally accepted principles of valuation, Company statements, internal Company documents, analyst reports, analysts' valuation models, and an event study focusing on the empirical reaction of Twitter's stock price to the corrective disclosures.

A. Financial Principles Establish the Economic Importance of the Allegedly Concealed Information

74. Plaintiffs allege that the Company's positive statements about its user growth trends were misleading without the context of the quality of growth in its userbase.⁷⁹ User engagement trends affect the Company's ability to grow MAU and its revenue generating prospects. Alleged misrepresentations and omissions about user growth and user

⁷⁸ I understand that materiality has a legal definition in matters such as this one. As the term is used in this report, economic materiality means the importance of information, announcements, and/or events to investors and the market, such that these items would affect the valuation of a security and investors' demand for the security. Whether or not specific information is important for valuation purposes is a central focus of financial economics. Therefore, the question of economic materiality, given this definition, is squarely within the realm of financial economics and consequently within my area of expertise and the purview of a finance expert.

⁷⁹ See, e.g., Complaint, ¶24: "Neither MAU nor user engagement provides a complete picture of the business. In Twitter's case, the platform could have millions of users sign up (i.e., high MAU) but if those users logged in to the platform only once a month (i.e., low engagement), the business would suffer because fewer ads can be sold. Alternatively, the platform could have very active users who logged in multiple times a day (i.e., high engagement) but if the total number of users on the platform was limited (i.e., low MAU), the business would suffer for the same reason. The interplay between the two metrics also meant that user engagement data became more important if MAU was flat or declining."

engagement consequently misled investors about the Company's ability to grow, its future financial performance, and therefore its true value.

75. Prior to and throughout the Class Period, the Company highlighted that growing its user base while maintaining or growing its level of user engagement was critical to its ability to generate revenue.^{80,81} As these factors were critical to growing the Company's revenue, they would also be important to the value of Twitter stock. That revenue is an important determinant of a company's value, and consequently the value of its securities, is generally accepted and well-grounded in the finance literature.

"Revenue growth is a key determinant of value at these [Internet] firms. Firms that have faster growing revenues are likely to reach profitability sooner, other things remaining equal."

Investment Valuation, 3rd ed., by Aswath Damodaran, Wiley Finance, 2012, p. 564.

"In fact, it is hard to imagine performing a valuation without weighing various operating metrics relative to revenue. At the most basic revenue, revenue is an indication of breadth of the target's customer relationships or product acceptance, which is among the defining elements of a successful enterprise."

Distressed Debt Analysis, Strategies for Speculative Investors, by Stephen Moyer, J. Ross Publishing, Boca Raton, 2005, p. 115.

"Because forecasted revenues are so important to the process of valuing a firm, a review of a target company's revenue recognition policy is an excellent place to begin an analysis of income statement data."

Valuation: Avoiding the Winner's Curse, by Kenneth Ferris and Barbara Pecherot Petit, Prentice-Hall, Upper Saddle River, 2002, p. 145.

⁸⁰ See, e.g., "The best way to quantify the impact of engagement, and we have a lot of different metrics for engagement was to give you the perspective that our top 20 markets DAU-to-MAU is 48%. Again, they account – those markets account for 80% of our users and 90% of our revenue. If we were able to move the entire top 20 markets to 51% and you could imagine the first 10 markets probably have a higher DAU than the next 11 markets, if we're able to move the DAU-to-MAU ratio from 48% to 51%, that would generate an incremental \$500 million." ("Twitter, Inc. Analyst Day," *Factset:callstreet*, corrected transcript, 12 November 2014, p. 94.)

⁸¹ See, e.g., "As our user base and the level of engagement of our users grow, we believe the potential to increase our revenue grows," and "To the extent our user growth or user growth rate continues to slow, our revenue growth will become increasingly dependent on our ability to increase levels of user engagement." (Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, pp. 47-48.)

“Understanding a company’s potential for growing revenues in the future is critical to valuation and strategy assessment.”

Id., p. 97.

“Revenue growth is the most significant driver of shareholder value over the long term. Other drivers are very important, but tend to reach a limit in terms of value creation.”

Performance Dashboards and Analysis for Value Creation, by Jack Alexander, John Wiley & Sons, Inc., 2007, p. 79.

76. Damodaran (2012), a respected valuation authority, specifically attests to the particular importance of growing user base and increasing user engagement for Internet and social media companies.

“For Internet portals that generate revenue from advertising revenues that are based on traffic to the sites, the revenues can be stated in terms of the number of visitors to the sites ... In 2010, it was the social media companies such as Facebook and Twitter that were attracting market attention, partly because of their huge membership rolls.”

Investment Valuation, 3rd ed., by Aswath Damodaran, Wiley Finance, 2012, p. 573.

“For social media companies, value can be related to the number of members but only if the link between revenue and the number of members is made explicit. For instance, Facebook’s advertising revenues can be directly tied to the number of members, and the value of the company can be stated on a per-member basis. Since social media companies may have to invest resources to add to their membership, it is the net value generated for each member that ultimately determines value.”

Id., p. 575.

77. Damodaran (2012) further details that new users will not add value to the Company unless the quality of the new users is sufficient to offset the cost of adding that user, or rather, user growth alone is insufficient to add value to a Company. In the case of Twitter, new users would need to have high engagement to add value.⁸²

⁸² Company management confirmed the importance of the quality of new users to Twitter’s revenue-generating capacities during deposition. *See, e.g.*, Videotaped Deposition of Jeff DeJelo, dated 8 January 2019, at 28:10-31:19.

“Assume that the firm expects to continue to add new subscribers in the future years and that the firm will face a cost (advertising and promotion) of C_t for each new subscriber added in period t Note that the first term in this valuation equation represents the value generated by existing subscribers, and that the second is the value of expected growth. The subscribers added generate value only if the cost of adding a new subscriber (C_t) is less than the present value of net cash flows generated by that subscriber for the firm.”

Investment Valuation, 3rd ed., by Aswath Damodaran, Wiley Finance, 2012, p. 574.

78. As demonstrated below, the Company acknowledged that its ability to sustain or grow user engagement levels was important to the Company’s ability to grow revenue, and an important factor in the valuation of Twitter stock. Therefore, based on generally accepted valuation principles, the Company’s inability to maintain or grow user engagement levels, and to sustain meaningful growth in users, negatively impacted the true value of Twitter’s stock. Concealment of this information maintained the stock at an artificially inflated level.

B. Company Statements Establish the Economic Importance of the Allegedly Concealed Information

1. Public Company Statements Confirm The Economic Importance Of The Allegation-Related Information to The Company’s Business Model and Prospects

79. The Company considered information about its user engagement trends, ability to grow its user base, as well as the related financial metrics such as revenue, EBITDA, and earnings to be important drivers of the Company’s value and the valuation of its stock.
80. Both prior to and during the Class Period, the Company acknowledged the importance of its user growth trends and user engagement trends.

“If we fail to grow our user base, or if user engagement or ad engagement on our platform decline, our revenue, business and operating results may be harmed. The size of our user base and our users’ level of engagement are critical to our success. ...Our financial performance has been and will

“Q: Would you agree that attracting new users was important to revenue growth going forward?” “A: It really depends.” “Q: And what does it depend upon?” “A: Whether or not those users were monetizable.”

continue to be significantly determined by our success in growing the number of users and increasing their overall level of engagement on our platform as well as the number of ad engagements.”

Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, p. 11 (emphasis in original).

“If we are unable to increase our user base, user growth rate or user engagement, or if these metrics decline, our products and services could be less attractive to potential new users, as well as to advertisers and platform partners, which would have a material and adverse impact on our business, financial condition and operating results.”

Id., p. 12.

“Obviously, one of the recent reasons you’re all here is to understand the operating metrics like MAU that are inputs into the financial success that we have as a company.”

“Twitter, Inc. Analyst Day,” *Factset:callstreet*, corrected transcript, 12 November 2014, p. 4.

“Frequency. We haven’t spent a lot of time talking about DAU-to-MAU. And we thought about different types of measurements, engagement measurements, et cetera. The best way to quantify the impact of engagement, and we have a lot of different metrics for engagement was to give you the perspective that our top 20 markets DAU-to-MAU is 48%. Again, they account – those markets account for 80% of our users and 90% of our revenue. If we were able to move the entire top 20 markets to 51% and you could imagine the first 10 markets probably have a higher DAU than the next 11 markets, if we’re able to move the DAU-to-MAU ratio from 48% to 51%, that would generate an incremental \$500 million and that’s using again 5% ad load, 560 million MAUs, constant CPE and constant click-through rate.”

Id., p. 94.

“If we’re able to grow to 560 million monthly active users and our ad load is 5% CPE was held constant from where it is today, click-through rate was held from where it is today, there would be an incremental \$4.6 billion in revenue on top of the impact of the ad load that I already mentioned.”


Id.

2. Internal Company Communications Attest to the Importance of User Engagement Metrics and Trends to the Company's Forecasts and Business Model

81. Internal communications show that management tracked DAU regularly and attest to the importance of user engagement to the Company's forecasts and business model.

“[Christian Oestlien – Head of Growth]: Yes, the thinking is that DAU is a better reflection of the health of our product. While we will continue to report MAU externally, our internal focus is on driving daily active users, and we primarily hope to accomplish this by reducing our overall churn rate. [Kevin Weil – Head of Product]: Both will be important because I doubt we'll drop MAU as a reported metric any time soon, but since we're looking to drive *daily* engagement with our platform ultimately, DAU is what we're trying to optimize for.”

Internal Company email, 6 January 2015, Exhibit 171, [TWTR_SHEN_00228377-78, at 77].


Internal Company presentation, 28 May 2015, Exhibit 256, [TWTR_SHEN_00345175-182, at 179]

82. In November 2014, CFO Noto wrote in an internal email “if we are driving DAU increases than [*sic*] we are focused on a frequency metric and at the end of the day our MAUs will be more monetizable if we drive DAUs.”⁸³
83. In December 2014, CFO Noto, asked Kevin Weil, the head of the Product team, to generate “growth targets for MAU and DAU for each of our top 20 markets for 2015.” CFO Noto stated: “we need specific goals that teams are shooting for that are also tied to our revenue goals or we won't have the alignment that is necessary given where we are in scale and growth of users per market vs revenue growth expectations per market.”⁸⁴

⁸³ Internal Company email, 3 November 2014, Exhibit 281, [TWTR_SHEN_00330811].

⁸⁴ Internal Company email, 12 December 2014, Exhibit 334, [TWTR_SHEN_00330846].

84. Following the Company's Q4 2014 earnings announcement, Twitter executives prepared a presentation for the Board of Directors titled "Business Update Q4 2014 Results & Key Trends Q1 2015 Update."⁸⁵ According to this presentation, [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED].⁸⁶ A later internal presentation noted that [REDACTED].⁸⁷ In fact the DAU/MAU ratio had [REDACTED].⁸⁸

85. The Company understood that increasing MAUs alone would not drive revenues. An email discussing risks and opportunities identified poor user quality as a risk facing Twitter.⁸⁹ According to the email, "[REDACTED]

[REDACTED]
[REDACTED].

"One other thing to add as a risk (Adam, Jeremy and I have discussed this one. but may be new info to others): [REDACTED]

[REDACTED]

Internal Company email, 26 March 2015, Exhibit 116, [TWTR_SHEN_00262747-751, at 747].

86. Internal documents and communications also show that the DAU/MAU ratio was a key input for the Company's revenue forecast.

⁸⁵ Presentation attached to Internal Company email, 19 February 2015, Exhibit 107, [TWTR_SHEN_00349769-790.024].

⁸⁶ Presentation attached to Internal Company email, 19 February 2015, Exhibit 107, [TWTR_SHEN_00349769-790.024, at 790.013].

⁸⁷ "User and Monetization Metrics," [TWTR_SHEN_00356538].

⁸⁸ Presentation attached to Internal Company email, 19 February 2015, Exhibit 107, [TWTR_SHEN_00349769-790.024, at 790.013].

⁸⁹ Internal Company email, 26 March 2015, Exhibit 116, [TWTR_SHEN_00262747-751, at 747].

“[Jeff DeJelo – Director of Sales Finance]: [REDACTED]
[REDACTED]. [F]or bottom-end
of the range, we used the metrics driven model (reqs; coverage, CTR and
CPE). [REDACTED]
[REDACTED]

Internal Company email, 7 April 2015, [TWTR_SHEN_00211210].

“Revenue Metrics Model v1 [REDACTED] ... MAU x DAU x Ad
Requests/MAU x Coverage x eCPM...”

“CFO Catchup / Sales Finance / March 31, 2015,” Internal Company presentation,
[TWTR_SHEN_00274872.0001-0034, at 0026-0027].

87. Internal documents reveal that the Company constantly analyzed and monitored DAU/MAU to assess user engagement. Not only was user engagement of particular importance to the Company, it was important information that analysts frequently asked for in order to assess user growth trends.

C. Analyst Statements Confirm the Economic Importance of the Allegedly Concealed Information and the Valuation Relevance of the Disclosure Events

88. Consistent with the fundamental valuation principles set forth above and the Company’s public and internal statements, analysts considered user engagement metrics and trends to be important information for valuing the Company’s stock. Analysts expressed that user engagement and information relating to the Company’s ability to increase user engagement and user base, are integral determinants of revenue and earnings, and therefore are highly valuation relevant.
89. Analyst and investor expectations during the Class Period reflected the alleged misrepresentations, omissions, and consequently misleading information disseminated by the Company during their Q4 2014 and Q1 2015 earnings releases. Analyst statements and valuation model revisions following the corrective disclosures show that the market’s misunderstandings about Twitter’s business condition and the stock’s inflated value stemmed from the alleged misrepresentations and omissions. The revelations were received as highly negative for the Company and the valuation of Twitter stock. Samples

of this analyst commentary and model revisions are presented above in the timeline of events, and representative examples are presented below.

90. Analysts understood and commented on the economic importance of the growth in Twitter's user base and the increase in user engagement levels in projecting growth and valuing the Company.⁹⁰ For example:

"Key Metrics. While revenue and profitability are important, we believe the focus remains on user growth (arguably the most important metric for the business) and engagement."

"Expect Upside to Revenue and Earnings, but Focus Remains on Users and Engagement; Maintain NEUTRAL," by Shyam Patil and Andy Cheng, Wedbush, analyst report, 2 February 2015, p. 1.

91. User engagement metrics and trends were necessary to accurately value Twitter's business and stock.⁹¹ For example:

"The discontinuation of TLV reporting without providing alternative metrics impairs transparency;"

"Poor Sentiment Amplifies Strong Engagement and Pricing," by Tony Wible and Murali Sankar, Janney, analyst report, 6 February 2015, p. 1.

92. Analyst and investor expectations reflected the alleged misleading information disseminated by the Company on during their Q4 2014 and Q1 2015 earnings releases. Analyst reports published prior to the Class Period further demonstrate that the alleged misstatements during the Class Period served to maintain the market's prior

⁹⁰ See, also, "Twitter Outperforms During Fourth Quarter, Driving Stock Price Higher," Trefis, analyst report, 9 February 2015, p. 1; "Monetization Remains Strong, User Adds Expected to Rebound in 1Q; Maintain NEUTRAL," by Shyam Patil and Andy Cheng, Wedbush, analyst report, 6 February 2015, p. 2; "Strong 4Q:14 as Ad Demand Continues to Outstrip Supply on Platform; Reiterate BUY," by Youssef Squali, et al., Cantor Fitzgerald, analyst report, 6 February 2015, p. 1; "#Strengtheningthecore," by Mark S. Mahaney, et al., RBC Capital Markets, analyst report, 6 February 2015, p. 4; "We See Favorable Risk-Reward on TWTR into the Q4 Earnings Results," by Rob Sanderson, MKM Partners, analyst report, 3 February 2015, p. 1; "Solid 4Q:14 Expected; Monetization Key Driver ST/Users Matter LT," by Youssef Squali, et al., Cantor Fitzgerald, analyst report, 2 February 2015, p. 1; and "Product Improvements Should Increase Engagement; Initiate at Buy with \$65 PT," by Brian Pitz, et al., Jefferies, analyst report, 1 April 2015, p. 4.

⁹¹ See, also, "Key Points Ahead Of 4Q14 Earnings For GrubHub, Twitter, Yelp, & Expedia," by Ronald V. Josey, et al., JMP Securities, analyst report, 4 February 2015, p. 7; and "#OneStepForward," by Eric J. Sheridan, et al., UBS, analyst report, 6 February 2015, p. 1.

understanding of the Company's business model and the key metrics, concealing a downturn.⁹² For example:

"We are hopeful of more metrics that show daily behaviors. The company has a stated goal of wanting to become the largest daily user base. If daily users are what the mission is, daily or daily/monthly metrics should be key to proving out success. ... Why Overweight? We believe Twitter will be able to continue to narrow the monetization gap internationally and further increase engagement among current and new subscribers."

"Flight Plan – Analyst Day Thoughts," by Paul Vogel, et al., Barclays, analyst report, 13 November 2014, pp. 1-2.

"Engagement rate (TLV/MAU) grew. MAU of 288M grew by 20% Y/Y (and 4M Q/Q) and was below the 292M consensus, while timeline views (TLV) of 180.6B grew 22% Y/Y and slightly exceeded the 178.7B consensus. This led to TLV/MAU (key engagement rate metric) of 631, up 3% Y/Y and above consensus of 612 (though down from 636 in FQ3). ...As the table below shows, MAU growth decelerated a bit but engagement rate growth accelerated while monetization (AR/1K TLV) decelerated."

"TWTR: MAU Growth about to Pick Up as Engagement Rate Improves – Raising PT to \$65," by Shelby Seyrafi, FBN Securities, analyst report, 7 February 2015, p. 1.

"Engagement Trends Twitter no longer discloses Timeline Views/MAU, the company's former self-defined measure of user engagement. As a result, it will be more challenging to track whether engagement levels are rising or falling at the company. However, management stated that the DAU/MAU ratio is similar to where it was at the Analyst Day last November. Further, the company said that Searches and Direct Messages accelerated in the

⁹² See, also, "Investor Day 2014 Recap," by Arvind Bhatia and Brett Strauser, Sterne Agee, analyst report, 13 November 2014, pp. 1-2; "Strong 4Q:14 as Ad Demand Continues to Outstrip Supply on Platform; Reiterate Buy," by Youssef Squali, et al., Cantor Fitzgerald, analyst report, 6 February 2015, p. 1; "Advertising Revenue Grew 97%; Upbeat MAU Outlook; Reiterate Market Outperform Rating & Raise Price Target to \$52," by Ronald V. Josey, et al., JMP Securities, analyst report, 6 February 2015, p. 1; "#Strengtheningthecore," by Mark S. Mahaney, et al., RBC Capital Markets, analyst report, 6 February 2015, p. 4; "Rough Quarter, Outlook Disappoints," by Paul Vogel, et al., Barclays, analyst report, 29 April 2015, p. 1; "Downgrading to Neutral; Limited Execution in Key Areas," by Martin Pyykkonen, Rosenblatt Securities, analyst report, 29 April 2015, pp. 1-2; and "Euphoria Back To Despair, But LT Story Intact," by Ross Sandler, et al., Deutsche Bank, analyst report, 29 April 2015, p. 1.

quarter, with Favorites and Re-Tweets showing ‘strong growth.’ So qualitatively, it doesn’t appear that there was any degradation in Twitter’s engagement metrics.”

“Twitter Dropping...,” by Mark S. Mahaney, et al., RBC Capital Markets, analyst report, 28 April 2015, p. 3.

93. Upon the corrective disclosures, analyst sentiment changed for the worse and analysts revised their models accordingly.⁹³ For example:

“Our broad concerns remain two-fold. First, it’s not clear that the company’s substantial product changes can reaccelerate its User & Usage metrics. And mgmt’s cautious commentary about Q2 MAU growth compounds doubts about Twitter’s user value proposition.”

Id., p. 1.

“While we think most of the advertiser-related issues are temporary, the most negative aspect of the quarter in our view was the ‘low visibility’ regarding Q2 (& beyond?) MAU growth. This could temper enthusiasm for the stock until corrected, or investors get comfortable with long-term growth driven solely by monetization improvements. ... We lower our price

⁹³ See, also, “Rough Quarter, Outlook Disappoints,” by Paul Vogel, et al., Barclays, analyst report, 29 April 2015, p. 1; “Searching for Two Steps Forward,” by Eric Sheridan, et al., UBS, analyst report, 28 April 2015, p. 1; “Early Bird Results Disappoint,” by Blake Harper, Wunderlich, analyst report, 29 April 2015, [TWTR_SHEN_00121085]; “Downgrading to Neutral; Limited Execution in Key Areas,” by Martin Pyykkonen, Rosenblatt Securities, analyst report, 29 April 2015, p. 1; “Rough Quarter, Outlook Disappoints,” by Paul Vogel, et al., Barclays, analyst report, 29 April 2015, p. 1; “Uneven Ad Demand Adds to User Challenges,” by Peter Stabler, et al., Wells Fargo, analyst report, 29 April 2015, p. 1; “2Q15 Results: Good Financial Results, User Issues Concerning,” by John Blackledge, et al., Cowen and Company, analyst report, 29 July 2015, p. 1; “TWTR: No Easy Fix To User Growth Issue,” by Peter Stabler, et al., Wells Fargo, analyst report, 29 July 2015, pp. 1-2; “Bar Reset on User Growth Expectations,” by Daniel Salmon, et al., BMO Capital Markets, analyst report, 29 July 2015, p. 1; “Fading Fast Followers; Reiterate Hold and Retain Negative Bias,” By Scott Devitt, et al., Stifel, analyst report, 28 July 2015, p. 1; “MAUs Losing Altitude,” by Mark May and Ryan Ripp, Citi, analyst report, 28 July 2015, p. 4; “2Q Beat, But Still Hasn’t Cracked The User Code; Neutral,” by Justin Post and Joyce Tran, Bank of America Merrill Lynch, analyst report, 29 July 2015, p. 1; “Twitter 2Q15 Review: Stock Won’t Work If Users Don’t Grow,” by Carlos Kirjner, et al., Bernstein, 29 July 2015, pp. 1-3; “Still Searching For Mass Market Appeal and Usage,” by Martin Pyykkonen, Rosenblatt Securities, analyst report, 29 July 2015, pp. 1-2; “Bluebird Sings the MAU Blues; TP to \$33,” by Anthony DiClemente and Kevin Rippey, Nomura, analyst report, 29 July 2015, p. 1.

target from \$56 to \$52, based on 35x (down from 40x) our lower 2018 non-GAAP EPS estimate of \$2.00 (down from \$2.02), discounted to present at ~10%.”

“Mixed Q1 with Tempered Outlook but Thesis Still Intact,” by Michael Graham and Austin Moldow, Canaccord Genuity, analyst report, 28 April 2015, p. 1.

“Question marks around company’s ability to drive sustainable user growth: Consistent commentary around the inability to break into the “mass market” makes us wary of TWTR’s addressable audience, and the question marks around the company’s ability to drive future user net adds are unlikely to go away in the near-term. Twitter has yet to prove itself as a platform that can drive continuous (daily) engagement and usage.”

“Fewer Birds: Price Target to \$36,” by Brian Nowak, et al., Morgan Stanley, analyst report, 29 July 2015, p. 1.

“Our FY16 rev./adj EBITDA estimates go to \$3.27bn/\$870m from \$3.41bn/\$1.02bn as weaker user trends impact revenue growth, which drops to the bottom line. Our EV/EBITDA multiple goes to 24x from 30x, reflecting the company’s reduced growth prospects.”

“Weak MAUs Raises Growth Sustainability Concerns,” by James Cordwell, Atlantic Equities, 29 July 2015, p. 1.

D. Empirical Confirmation Of Loss Causation

94. Over the course of the Class Period, the alleged misrepresentations and omissions caused the price of Twitter stock to be artificially inflated. Without accurate user engagement information, the market was misled by Company representations about user base growth and user quality. Because they were misled, market participants were surprised when they ultimately learned the truth about user base growth and quality. When the market learned the truth about the Company’s poor user growth and user engagement trends and metrics, and financial implications associated therewith, the artificial inflation in the price of Twitter stock dissipated, causing the stock price to fall, and thereby causing investor losses.
95. These conclusions, compelled by financial valuation principles, Company statements, and analyst commentary and valuation models, are also proved empirically by event study analysis focusing on the reaction of Twitter stock to the corrective disclosures.

1. Event Study

96. In order to determine whether the alleged misrepresentations and omissions and subsequent corrective disclosures caused investor losses, I conducted an event study. An event study examines whether a security price reacted to the release of new information. A statistically significant stock price reaction in response to the release of new information indicates that the new information caused the price change.
97. Event study analysis is one of the most commonly used analytic methodologies employed by finance researchers. MacKinlay [1997] presents a description and examples of the methodology and writes about how it is generally accepted and widely used in academic research.⁹⁴ Crew, et al., [2017] write about how the methodology is generally accepted and widely used in forensic applications.⁹⁵
98. An event study measures how much a stock price rises or falls in response to new, company-specific information. One component of an event study is statistical regression analysis that determines how much of a stock price change is explained by market and industry sector factors, rather than company-specific information, so that those influences can be statistically factored out. The portion of a stock price change that cannot be attributable to market or sector factors is called the residual stock price movement or “residual return.” The event study isolates the residual return and also tests whether or not the residual return can reasonably be explained as merely a random fluctuation.
99. If the stock return is deemed statistically significant, it indicates that the stock price movement cannot be attributed to market and sector factors, or to random volatility, but rather was caused by new company-specific information.

⁹⁴ “Event Studies in Economics and Finance,” by A. Craig MacKinlay, *Journal of Economic Literature*, March 1997.

⁹⁵ “Federal Securities Acts and Areas of Expert Analysis,” by Nicholas Crew, et al., in Chapter 27 of the *Litigation Services Handbook: The Role of the Financial Expert*, 6th ed., edited by Roman Weil, Daniel Lentz, and Elizabeth Evans, John Wiley & Sons, Inc., 2017.

(a) Corrective Disclosure Event Dates

100. I focused the event study on the market's reaction to the three alleged corrective disclosure events:

- i. **28 April 2015** – On 28 April 2015, prior to the close of trading, Twitter's Q1 2015 financial results and performance metrics were partially leaked by an unaffiliated third-party company.⁹⁶ Subsequent to the leak, trading of Twitter stock was halted, and the Company released all its financial results for Q1 2015.⁹⁷ The Company reported Q1 revenue below expectations and guidance, and further reduced its FY2015 revenue guidance.⁹⁸ Internal company documents established that the Company attributed the FY2015 revenue guidance reduction to, among other things, flat or declining user engagement.⁹⁹
- ii. **29 April 2015** – After the close of trading on 28 April 2015, Twitter held a conference call with investors.¹⁰⁰ On the conference call, management gave disappointing MAU growth guidance. As the conference call was after the close of trading, the effective event date was the next day.
- iii. **29 July 2015 – 3 August 2015** – On 28 July 2015, after the close of trading, the Company announced its financial results for Q2 2015 and held a conference call with investors.¹⁰¹ On the conference call, management disclosed that they expected MAU user growth to remain low in the near term.¹⁰² Management also disclosed quantitative user engagement trends for the first time during the Class Period.¹⁰³ Among other things, the Company disclosed that the DAU-to-MAU

⁹⁶ See, e.g., Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.

⁹⁷ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 April 2015, 3:36 PM.

⁹⁸ Id.

⁹⁹ See, e.g., TWTR_SHEN_00211210, and TWTR_SHEN_00274872.0001-0034.

¹⁰⁰ "Q1 2015 Twitter Inc Earnings Call," *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM.

¹⁰¹ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 July 2015; and "Q2 2015 Twitter Inc Earnings Call," *Thomson Reuters*, conference call, 28 July 2015, 5:00 PM.

¹⁰² "Q2 2015 Twitter Inc Earnings Call," *Thomson Reuters*, conference call, 28 July 2015, 5:00 PM, p. 14.

¹⁰³ Id., p. 5.

ratio for Twitter's top 20 markets had fallen from the 48% announced at Analyst Day to 44% during Q2 2015.¹⁰⁴ CFO Noto attributed Twitter's protracted stock price decline from 29 July 2015 to 3 August 2015 to analysts' and investors' continued revaluation of Twitter stock during that period in reaction to the final disclosure.¹⁰⁵

101. I examined three individual dates in my event study (28 April 2015, 29 April 2015, and 29 July 2015), and one multiday event window (29 July 2015 through 3 August 2015, inclusive).
102. The use of both single day and multiday event windows is appropriate in an event study and is grounded in the finance literature. Published empirical studies commonly examine event windows longer than one day and run "cumulative event studies" on multiday windows.¹⁰⁶

(b) Isolating the Impact of Company-Specific Information

103. Event study analysis determines how much of the Company's stock return following each of the events was driven by Company-specific information as opposed to market and industry sector factors.

¹⁰⁴ Id., p. 5.

¹⁰⁵ See, e.g., "Essentially this is what I think is happening we reported on Tuesday. Buyside analysts are developing an initial point of view that they communicate by end of day on wed but say I want to do more work over the coming days and will share more after I have chance to spend more time over the weekend given I have 3 companies reporting a day on Wed and Thursday .. The analyst takes a step back and takes a deeper dive over the weekend and publishes a more thorough view on Sunday night. That note says the following- the core business grew 50-53% not 60%+ ... if Twitter doesn't grow MAUs more than 5-10% in 2015 and 2016 we are looking at 35-40% growth best case in 2016 vs our prior view of 48%-50%+ growth. If it is growing 35-40% growth not sure why I would pay more than 5-6x revenue which is a mid twenties stock. They tell all of their PMs this [S]unday night. So PMs say ok I will start to lighten up my position over the coming days and they start selling a little and as the selling starts to escalate and people panic and try to get out faster as stock breaks \$30 and then \$29 Hence the high volume in trading and the stock breaking through \$30 and then \$29." Internal Company email, 3 August 2015, [TWTR_SHEN_00319909] (ellipses in original).

¹⁰⁶ See, e.g., "In securities fraud cases, many experts have adopted the convention of looking at one-day, two-day, or five-day periods following an announcement." ("Materiality and Magnitude: Event Studies in the Courtroom," David I. Tabak and Frederick C. Dunbar in *Litigation Services Handbook, The Role of the Financial Expert*, 3rd ed., edited by Roman L. Weil, Michael J. Wagner, and Peter B. Frank, John Wiley & Sons, Inc., 2001, p. 19.4.) See, also, "Does M&A Pay? A Survey of Evidence for the Decision-Maker," by Robert F. Bruner, *Journal of Applied Finance*, Spring/Summer 2002; and "Stock Prices and the Publication of Second-Hand Information," by Peter Davies and Michael Canes, *Journal of Business*, vol 51, no. 1, 1978, pp. 43-56.

104. The method, which is generally accepted and widely used in econometric modeling, involves running a regression to determine how the price of Twitter stock typically behaved in relation to the overall stock market and its industry sector, and then using the regression model to determine how much of each event day's actual return is explained by the market and sector factors. The portion of the stock return that is apportioned to market and sector factors is called the explained return.
105. The explained return is then subtracted from the actual return to isolate the residual return, which is the stock's return after controlling for market and sector effects.
106. The regression equation models the return of Twitter stock as a function of: 1) a constant term, 2) the returns of the overall stock market, and 3) a sector index return.
107. For the overall stock market factor, I used the CRSP NYSE/AMEX/NASDAQ/ARCA Market Index (the "Market Index"), which is a generally accepted and widely used measure of the overall stock market performance. The Market Index appropriately incorporates payment of dividends by the constituent companies.
108. For the sector factor, I used the same index that Twitter identified as representative of its industry sector. In its Form 10-K for the fiscal year 2015, Twitter compared its performance to the Dow Jones Internet Composite Index (the "Sector Index").¹⁰⁷ Because Twitter is a constituent company in the Sector Index, I reconstructed the index excluding Twitter.
109. As in the Feinstein Report, all returns used in the regression are logarithmic returns. The Appendix in the Feinstein Report explains the construction and computational advantages of using logarithmic returns.
110. Twitter's stock prices, trading volume, and returns are shown in Exhibit-4. Exhibit-5 presents Market Index and Sector Index data.
111. I ran the regression on daily returns covering one full year starting on 29 July 2014 through the last day of the Class Period, 28 July 2015 ("Estimation Period"). The choice of using one full year ending on the last day of the Class Period for the regression Estimation Period is a widely used and generally accepted practice in event study analysis.

¹⁰⁷ Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, p. 40.

“Three general choices for the placement of an estimation window are before the event window, surrounding the event window, and after the event window.”

“Materiality and Magnitude: Event Studies in the Courtroom,” by David I. Tabak and Frederick C. Dunbar in *Litigation Services Handbook: The Role of the Financial Expert*, 3rd ed., edited by Roman L. Weil, Michael J. Wagner, and Peter B. Frank, John Wiley & Sons, Inc., 2001, p. 19.5.

112. Using dummy variables to control for potentially atypical observations in the regression estimation period, especially when those dates are the subject of the event study analysis, so that the model parameters properly reflect typical stock price dynamics, is a widely used and generally accepted methodology, as noted in the academic and finance literature.¹⁰⁸ Consequently, I used dummy variables in the regression model on earnings announcement and event dates.¹⁰⁹
113. The regression results are presented in Exhibit-6.
114. I computed the explained portion of Twitter stock return on each event date by adding: 1) the estimated regression intercept term, 2) the respective day’s Market Index return multiplied by the Market Index coefficient estimated by the regression, and 3) the respective day’s Sector Index return multiplied by the Sector Index coefficient estimated by the regression.
115. I then computed the residual return for each event date by subtracting the explained return from the actual return.

¹⁰⁸ See, e.g., “Event Studies with a Contaminated Estimation Period,” by Nihat Aktas, et al., *Journal of Corporate Finance*, 2007; “Measuring the Effects of Regulation with Stock Price Data,” by John J. Binder, *The RAND Journal of Economics*, 1985; “Intervention Analysis with Applications to Economic and Environmental Problems,” by G. E. P. Box and G. C. Tiao, *Journal of the American Statistical Association*, 1975; “Testing for Market Efficiency: A Comparison of the Cumulative Average Residual Methodology and Intervention Analysis,” by David F. Larcker, et al., *Journal of Financial & Quantitative Analysis*, 1980; “Measuring Abnormal Performance: The Event Parameter Approach Using Joint Generalized Least Squares,” by Paul H. Malatesta, *The Journal of Financial and Quantitative Analysis*, 1986; “Conditioning the Return-Generating Process on Firm-Specific Events: A Discussion of Event Study Methods,” by Rex Thompson, *The Journal of Financial and Quantitative Analysis*, 1985.

¹⁰⁹ The earnings announcement on 28-29 April 2015 was split across two days. The Company had intended to announce earnings after the close on 28 April 2015, but results were leaked prematurely by Selerity. Though it provided financial results just prior to the close on 28 April 2015, the Company still held its conference call after the close. As the earnings announcement was split across both days, and because both days are corrective disclosure event dates, the regression model contains dummy variables for both days.

(c) *t*-test

116. For each event, a statistical test called a *t*-test was conducted to determine whether the residual return of Twitter stock was statistically significant. Statistical significance means that the event return after controlling for the market and sector effects, was of such magnitude that it cannot be reasonably attributed to random volatility, but alternatively must have been caused by Company-specific information. A *t*-test compares the residual return on an event date to the typical residual return and volatility exhibited over the regression estimation period. If the event date residual return is far greater (positively or negatively) than the typical residual return, the *t*-test indicates that the residual return is statistically significant.¹¹⁰
117. The results of the event study are presented below and summarized in Exhibit-7.

2. Event Study Result and Analysis: 28 April 2015*a. Significant Stock Price Decline*

118. On 28 April 2015, Twitter stock declined 20.06% (on a logarithmic return basis). The Market Index return was 0.25%, and the Sector Index return was -0.46%. Based on the regression model, the explained return on Twitter stock was -0.87%. The difference between the actual return of -20.06% and the explained return of -0.87% is a residual return of -19.19%, or -\$9.02 per share.
119. A residual return of -19.19% is an unusually large one-day decline for Twitter stock. That residual return is associated with a *t*-statistic value of -9.70, which indicates that the residual return was too severe to have been merely a random fluctuation. The likelihood of obtaining a residual return of this magnitude and associated *t*-statistic given that particular explanation is virtually nil. Therefore, the stock price decline is deemed statistically significant, and one can conclude that the Company news caused the stock price decline that day.

¹¹⁰ The test is called the *t*-test because it involves the computation of a *t*-statistic, which is the event day residual return divided by the standard deviation of residual returns from the control period, *i.e.*, the regression estimation data comprising all other days. If the absolute value of the *t*-statistic is greater than the critical *t*-statistic value (± 1.96 for large samples), the likelihood of the stock having this residual return caused by random volatility alone is less than 5%, which is generally accepted to be so unlikely that the random volatility explanation can be rejected, and the stock return for that day is deemed statistically significant.

b. Identification of Company-Specific Disclosure

120. I examined all of the Company-related news that emerged after the close of trading on 27 April 2015, or during trading on 28 April 2015. I assessed which information was allegation-related and which was confounding. I assessed the valuation impact of both kinds of news. The following Company information was released over this timeframe:

- i. Q1 2015 revenue of \$436 million, below consensus expectations of \$456 million (a negative surprise of \$20 million).¹¹¹
- ii. Q1 2015 Mobile MAU of 241.6 million, reported by Selerity to be below analyst estimates of 243 million. Total MAUs (excluding SMS fast followers) of 302 million, in line with analyst estimates.¹¹²
- iii. The Company announced Q2 2015 revenue guidance in the range of \$470-\$485 million, below consensus expectations of \$538 million (a midpoint negative surprise of \$60.5 million).¹¹³
- iv. The Company reduced FY 2015 revenue guidance to a range of \$2.17-\$2.27 billion, below consensus expectations of \$2.37 billion (a midpoint negative surprise of \$150 million).¹¹⁴

(1) Q1 2015 Revenue

121. The Company's Q1 2015 revenue of \$436 million was below analyst consensus estimates of \$456 million, a miss of approximately \$20 million. Management attributed this \$20 million revenue shortfall to "direct-response products [that] fell short of our high expectations for Q1."¹¹⁵

¹¹¹ Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM; and Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 April 2015.

¹¹² Id.

¹¹³ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 April 2015.

¹¹⁴ Id.

¹¹⁵ "Q1 2015 Twitter Inc Earnings Call," *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM, p. 5.

122. The Company explained that this direct-response product revenue shortfall was caused by two advertising revenue factors: the Company “raising the bar on what constitutes an engagement or a click,”¹¹⁶ and “some advertisers limited spending at higher levels of scale because the bids required to win incremental auctions were higher than they were willing to pay.”¹¹⁷ The Company explained that this revenue shortfall “was directly attributed to direct response and it was directly attributed to demand as opposed to supply.”¹¹⁸
123. Not only was reported Q1 revenue a backward-looking item, but there are two reasons why this item would not have a persistent negative effect substantially impacting the stock price. First, forward looking revenue guidance was provided as a separate item. Company and analyst commentary explained the rationales for the forward guidance separately from the past result. I explicitly account for the effect of past revenue on forward guidance in analyzing that item.
124. Second, the Company explained that the Q1 revenue shortfall would have a long-term positive impact on the Company’s revenue, stating that future ROI impacts from “raising the bar on what constitutes an engagement or a click,” would “more than offset the lower click-through rate we’re seeing today.”¹¹⁹ It was understood that the change in direct response products would have a modest transitory impact on Q2 2015 revenue (discussed below), but would be net positive thereafter.¹²⁰

¹¹⁶ Id., p. 6.

¹¹⁷ “Q1 2015 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM, p. 6.

¹¹⁸ Id., p. 8.

¹¹⁹ Id., pp. 5-6.

¹²⁰ See, “As a result of these two factors, revenue in the first quarter came in 2% below the mid-point of our previously forecasted range. We expect these factors to carry over into Q2, with improvement in the second half of the year.” (“Q1 2015 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM, p. 6.)

“Today, this results in a lower click-through rate and less revenue for Twitter. However, longer term we expect the higher ROI that advertisers are getting from these higher-quality leads to result in CPs that more than offset the lower click-through rate we’re seeing today.”

“Q1 2015 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM, p. 6.

125. Given that the Company considered this impact to be transitory in nature, I assess the \$20 million past Q1 2015 revenue shortfall as having a non-recurring impact on the value of Twitter stock.¹²¹ I separately and explicitly assess the impact of this information on Q2 2015 guidance below. As the Company explained that the impact of these direct response product changes would have a positive impact beyond Q2 2015, this information would not have long-term negative valuation impact.
126. While the \$20 million Q1 2015 revenue shortfall may indeed have been related to the concealed adverse user engagement trend, to be conservative, I treat it as unrelated. To be additionally conservative, I assume no marginal costs associated with the foregone \$20 million, so that the revenue shortfall translates directly to a negative impact of \$0.03 per share.¹²²
127. Consequently, I attribute \$0.03 of the \$9.02 residual stock price decline per share on 28 April 2015 to the impact of Q1 2015 revenue miss, and exclude this amount from fraud-related loss.

(2) Q1 2015 Mobile MAU

128. The Company reported 302 million MAU during Q1 2015, exactly in line with analyst expectations.¹²³ The Company reported that approximately 80% of the 302 million MAU was Average Mobile MAU, or 241.6 million users.¹²⁴ While 302 million MAU was in

¹²¹ Some of the Company’s lower than expected Q1 2015 revenue is reasonably related to the Plaintiffs’ allegations. For example, the quality of leads sought by advertisers for direct response products would be impacted by user engagement (or quality of the lead generated from the average MAU).

¹²² Equal to \$20 million, divided by 640.5 million shares outstanding during the first quarter. Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 April 2015.

¹²³ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 April 2015.

¹²⁴ *Id.*

line with analysts' expectation, Selerity reported that the 241.6 million Mobile MAUs were below analyst estimates of 243 million Mobile MAUs.¹²⁵

129. Based on my review of the Company and analysts' statements surrounding the 28 April 2015 earnings announcement, there is no indication or valid rationale supporting that this information contributed to Twitter's 28 April 2015 stock price decline. The composition of MAU between mobile and non-mobile may have differed from expectations, but as the Company represented, this division was immaterial.¹²⁶ Therefore, I attribute no portion of Twitter's stock price decline that day to Selerity's representation that Mobile MAUs were 1.4 million below consensus.

(3) Q2 2015 Revenue Guidance

130. In its press release, the Company established Q2 2015 revenue guidance in the range of \$470-\$485 million, below consensus estimates of \$538 million (a midpoint negative surprise of \$60.5 million).¹²⁷ I understand that Plaintiffs have alleged, and intend to prove, that Twitter's revenue guidance reduction was caused by the concealed adverse user engagement trend, about which investors were misled on account of the misrepresentations and omissions. However, a portion of the Q2 2015 revenue guidance shortfall derives from "direct-response products,"¹²⁸ which is not a fraud-related factor. I estimated the value impact of this non-fraud-related factor and excluded it from fraud-related losses.

¹²⁵ "#BREAKING: Twitter \$TWTR Q1 Mobile Monthly Active Users (MAUs) misses estimates, 241.6M vs. 243M expected," Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.

¹²⁶ As the Company does not attribute any difference to revenue contribution depending on the MAU platform (mobile or non-mobile), and analysts do not note any differences in these two MAU user characteristics in their models, I attribute none (\$0.00) of the \$9.02 residual stock price decline on 28 April 2015 to this information. To the extent that mobile-MAUs may or may not have an incremental valuation impact above non-mobile MAUs, the Company explains that any such impact is attributable to the "user engagement" characteristics of these users. Such information would be related to the allegations and would not need to be disaggregated. See, e.g., "We have experienced strong growth in advertising revenue from mobile devices because user engagement is significantly higher on mobile applications than on our desktop applications, and we expect this trend to continue." (Twitter, Inc., Form 10-K for the fiscal year ended 31 December 2014, filed 2 March 2015, p. 49.)

¹²⁷ Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 April 2015.

¹²⁸ "Q1 2015 Twitter Inc Earnings Call," *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM, p. 5.

131. CFO Noto stated that revenue for the “first quarter came in 2% below the mid-point of our previously forecasted range. We expect these factors to carry over into Q2.”¹²⁹ However, the Company reassured analysts that this was a transitory effect, and that the long-term positive impact on the Company’s revenue more than offset the short term impact.¹³⁰ Because the changes to its direct-response products were expected to have a long-term positive impact on the Company’s revenue that more than offset the short-term negative impact, these changes would be value accretive and have an overall positive impact on the value of Twitter stock. Reasonably, therefore, this factor contributed no amount to the stock decline that day. Nonetheless, to provide a conservative estimate of fraud-related losses, I computed a maximum loss attributable to this potentially confounding information, as follows.
132. The Company stated that as a result of the changes to its direct response products “revenue in the first quarter came in 2% below the mid-point of our previously forecasted range. We expect these factors to carry over into Q2.”¹³¹ I multiplied 2% (the negative impact estimated by the Company) by \$538 million (analysts’ consensus estimates for Q2 prior to the announcement announcement), arriving at a total valuation impact of \$10.76 million, or \$0.02 per share (equal to \$10.76 million divided by 640.5 million shares outstanding).¹³²
133. I assume no marginal costs associated with the foregone \$10.76 million, so that the revenue shortfall translates directly to a negative impact of \$0.02 per share, which I exclude from fraud-related loss.

¹²⁹ Id, p. 5.

¹³⁰ See, e.g., “today, this results in a lower click-through rate and less revenue for Twitter. However, longer term we expect the higher ROI that advertisers are getting from these higher-quality leads to result in CPs that more than offset the lower click-through rate we’re seeing today.” (“Q1 2015 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM, p. 6.)

¹³¹ “Q1 2015 Twitter Inc Earnings Call,” *Thomson Reuters*, conference call, 28 April 2015, 5:00 PM, p. 6.

¹³² Rounding up to the nearest cent.

(4) FY 2015 Revenue Guidance

134. In its press release, the Company reduced its FY 2015 revenue guidance range to \$2.17-\$2.27 billion from \$2.30-\$2.35 billion, below consensus estimates of \$2.37 billion (a midpoint negative surprise of \$150 million).¹³³
135. While management publicly attributed the remainder of the FY2015 revenue guidance reduction to various factors, I understand that Plaintiffs have alleged, and intend to prove, that Twitter's revenue guidance reduction was caused by the concealed adverse user engagement trend, about which investors were misled on account of the misrepresentations and omissions. Internal Company communications demonstrate that the reduction in FY 2015 revenue guidance was substantially caused by poor user engagement trends – i.e., “relatively flat” DAU growth.¹³⁴

“[Jeff DeJelo – Director of Sales Finance]: [REDACTED]
[REDACTED] [F]or bottom-end
of the range, we used the metrics driven model (reqs; coverage, CTR and
CPE). [REDACTED]
[REDACTED]

Internal Company email, 7 April 2015, [TWTR_SHEN_00211210].

“[Anthony Noto – CFO]: Celia where do you think our full year guidance
will be for Revenue?

[Celia Poon]: It depends on whether we can use Trinidad to our advantage
as it could add [REDACTED] W/o Trinie, I think [REDACTED] (no room for upside
for sure and some risks based on visibility of ad metrics). So [REDACTED]
w/ Trinie. A more conservative range could be [REDACTED]
w/ Trinie.”

Internal Company email, 2 April 2015, [TWTR_SHEN_00328186-89, at 86].

136. Given that internal Company documents tie the FY 2015 revenue guidance reduction to poor user engagement, specifically DAU metrics and growth, the FY 2015 revenue guidance reduction other than the portion accounted for in paragraphs 127 and 133 above,

¹³³ “Twitter, Inc., Form 8-K, Exhibit 99.1, filed 28 April 2015. Consensus estimates obtained from FactSet.

¹³⁴ Internal Company email, 7 April 2015, [TWTR_SHEN_00211210].

is an allegation-related corrective disclosure. The loss attributable to that revenue guidance reduction is fraud-related loss.

137. In sum, of the \$9.02 per share residual decline in Twitter's stock on 28 April 2015, I estimate that \$8.97 per share was caused by disclosures related to Plaintiffs' allegations. The \$0.05 difference is attributable disappointing revenue results and guidance that I conservatively deem to be confounding.

3. Event Study Result and Analysis: 29 April 2015

a. *Significant Stock Price Decline*

138. On 29 April 2015, Twitter stock declined 9.37% (on a logarithmic return basis). The Market Index return was -0.39%, and the Sector Index return was 0.25%. Based on the regression model, the explained return on Twitter stock was 0.46%. The difference between the actual return of -9.37% and the explained return of 0.46% is a residual return of -9.83%, or -\$3.96 per share.
139. A residual return of -9.83% is an unusually large one-day decline for Twitter stock. That residual return is associated with a *t*-statistic value of -4.97, which indicates that the residual return was too severe to have been merely a random fluctuation. The likelihood of obtaining a residual return of this magnitude and associated *t*-statistic given that particular explanation is virtually nil. Therefore, the stock price decline is deemed statistically significant, and one can conclude that the Company news caused the stock price decline that day.

b. *Potentially Confounding Information*

140. I examined all of the Company-related news that emerged after the close of trading on 28 April 2015, or during trading on 29 April 2015, and assessed the valuation impact, if any, of potentially confounding information. I found no Company-specific news that would reasonably have contributed to the \$3.96 Twitter residual stock price decline on 29 April 2015, other than the disclosure of allegation-related information.
141. I therefore conclude that all of the \$3.96 per share residual stock price decline on 29 April 2015 was caused by the partially corrective disclosure.

4. Event Study Results: 29 July 2015 through 3 August 2015

a. *Significant Cumulative Stock Price Decline*

142. On 29 July 2015 through 3 August 2015, inclusive, Twitter stock declined 22.18% (on a logarithmic return basis). The Market Index return for that period was 0.39%, and the Sector Index return was 0.68%. Based on the regression model, the explained portion of the return on Twitter stock was 0.44%. The difference between the actual return of -22.18% and the explained return of 0.44% is a residual return of -22.62%, or -\$7.41 per share.¹³⁵
143. The four-day residual return is associated with a cumulative *t*-statistic value of -5.72. The likelihood of obtaining a residual return of this magnitude and associated *t*-statistic given that particular explanation is virtually nil. Therefore, the stock price decline is deemed statistically significant.

b. *Potentially Confounding Information*

144. I examined all of the Company-related news that emerged between the close of trading on 28 July 2015 and the close of trading on 3 August 2015, and assessed the valuation impact, if any, of potentially confounding information. I found no other Company-specific news that would reasonably have contributed to the \$7.41 Twitter cumulative residual stock price decline on 29 July 2015 to 3 August 2015.
145. I found no Company-specific news that would reasonably have contributed to the Twitter residual stock price decline on 29 July 2015, other than the disclosure of allegation-related information, including disclosures regarding limited visibility into user growth and declining user engagement levels. Additionally, I found no Company-specific news that would reasonably have contributed to the \$2.01 cumulative residual stock price decline from the close of trading on 29 July 2015 through 3 August 2015, other than the market's continuing reassessment of the value of Twitter stock in response to the final corrective disclosure.

¹³⁵ As shown in Exhibit-7, the one-day price declines on 29 July 2015 and 3 August 2015 are statistically significant individually. On 29 July 2015, Twitter's stock residual return was -16.00%, or -\$5.40 per share, and associated with a *t*-statistic value of -8.09.

146. I therefore conclude that all of the \$7.41 per share cumulative residual stock price decline from 29 July 2015 through 3 August 2015 was caused by the 28 July 2015 corrective disclosure event. Analysts and investors required this interval of time to fully assess the valuation impact of the 29 July 2015 disclosures. This attribution of Twitter's decline over the four-day window is consistent with the explanation put forth by CFO Noto and other market participants. CFO Noto described how and why the information disclosed on 29 July 2015 continued to impact Twitter's stock price through 3 August 2015.

“Essentially this is what I think is happening we reported on Tuesday. Buyside analysts are developing an initial point of view that they communicate by end of day on wed but say I want to do more work over the coming days and will share more after I have chance to spend more time over the weekend given I have 3 companies reporting a day on Wed and Thursday .. The analyst takes a step back and takes a deeper dive over the weekend and publishes a more thorough view on Sunday night. That note says the following- the core business grew 50-53% not 60%+if Twitter doesn't grow MAUs more than 5-10% in 2015 and 2016 we are looking at 35-40% growth best case in 2016 vs our prior view of 48%-50%+ growth. If it is growing 35-40% growth not sure why I would pay more than 5-6x revenue which is a mid twenties stock. They tell all of their PMs this Sunday night. So PMs say ok I will stall to lighten up my position over the coming days and they start selling a little and as the selling starts to escalate and people panic and try to get out faster as stock breaks \$30 and then \$29. Hence the high volume in trading and the stock breaking through \$30 and then \$29.”

Internal Company email, 3 August 2015, [TWTR_SHEN_00319909].

147. Market participants concurred with CFO Noto, offering similar explanations. A Goldman Sachs investment banker informed CFO Noto that among other things, “commentary around MAU growth needing time for recovery is continuing to cause significant concern with investors.”¹³⁶
148. On 3 August 2015, SunTrust analyst Robert Peck stated in an interview on CNBC stressing on the importance of user growth and user engagement being fundamental to the success of Twitter. He stated that Twitter fundamentals would have to change. New

¹³⁶ Internal Company email, 4 August 2015, [GS_0001397].

products being launched by Twitter would have to resonate with users such that they would engage more with the platform driving monetization.¹³⁷ Barclays director Glenn Carell informed CFO Noto that the sales of Twitter stock accelerated after the August 3rd interview on CNBC with SunTrust analyst Rob Peck.¹³⁸

149. News media attributed the stock price slide in the days following the Q2 2015 earnings announcement to the poor user growth outlook disclosed by the Company.

“Shares of Twitter Inc. (TWTR) touched a record low on Monday, weighed down by negative comments from the micro-blogging site’s executives on its user growth.”

“Twitter Shares Hit Record Low Amid Growth Concerns,” *RTT News*, 4 August 2015.

150. *The Wall Street Journal* quoted an analyst report that came out on August 3rd by Albert Fried & Co. analyst Robert Tully, “today people are reconciling the their 20-year models because guess what no one, not even a grumpy man like me, modeled Twitter users as flat.”¹³⁹
151. The market processed the unexpected, complex, adverse news over the four trading days following the Company’s disclosure, and the stock price fell significantly over that period.

5. Event Study Summary

152. The statistical significance of the residual declines in the Twitter share price following the corrective disclosures, coupled with examination of and accounting for potentially confounding information, establish that the corrective disclosures caused the stock price to decline on those dates. It follows that the misrepresentations and omissions had previously caused the Twitter stock price to be artificially inflated, and thus caused investor losses.

¹³⁷ <https://www.cnbc.com/video/2015/08/03/twitter-needs-more-than-just-a-new-ceo-analyst.html>; [TWTR_SHEN_00230554].

¹³⁸ Internal Company email, 4 August 2015, [TWTR_SHEN_00230554].

¹³⁹ “Twitter Shares Hit New Low Amid Old Concerns,” by Paul Vigna, *The Wall Street Journal*, 5 August 2015, 1:33 PM.

V. DAMAGES

A. Artificial Inflation Ribbon

153. Artificial inflation is the difference between what the stock price actually was at a point in time, and what the price would have been absent the alleged fraud. An inflation ribbon is a time series indicating how much artificial inflation caused by the alleged fraud was in the stock price on each day of the Class Period. When the stock price falls on account of a corrective disclosure, inflation dissipates. Inflation after such a corrective disclosure and significant price movement must be less than the inflation prior to the disclosure.
154. The inflation ribbon is typically constructed by working chronologically backwards cumulating fraud-related residual price declines as they occurred. The observation of a significant residual stock price reaction to a corrective disclosure, allows one to measure how much artificial inflation had been in the stock price prior to the disclosure. The residual return, after accounting for the effect of potentially confounding information, measures how much artificial inflation in total exited the stock price, and therefore also measures how much artificial inflation had previously been in the stock price. Using the fraud-related price declines on and after a corrective disclosure date to measure the amount of inflation that was in the stock price prior to that date is a widely-used and generally accepted methodology.¹⁴⁰ The inflation just prior to a partially corrective disclosure must be the sum of the inflation the disclosure dissipated plus the inflation remaining afterward.
155. According to the Complaint, and detailed above, Defendants made misrepresentations and omissions that misled investors about adverse user growth and user engagement trends that negatively affected the Company's condition and prospects. The sum of residual declines attributable to the corrective disclosures, through which the market learned the truth about Twitter's poor user growth, declining user engagement, DAU metrics, and DAU/MAU trends, equals the dollar value of the market's prior overestimation of the Company's growth, revenues, EBITDA, and earnings concealed by the alleged misrepresentations and omissions.

¹⁴⁰ See, "Federal Securities Acts and Areas of Expert Analysis," by Nicholas Crew, et al., in Chapter 27 of the *Litigation Services Handbook: The Role of the Financial Expert*, 6th edition, edited by Roman Weil, Daniel Lentz, and Elizabeth Evans, John Wiley & Sons, Inc., 2017.

156. Had analysts and investors been informed at the start of the Class Period, and throughout, of poor user growth and user engagement trends, and financial implications associated therewith, the stock price would have fallen at the start of the Class Period to reflect this adverse information.
157. Assuming the Plaintiffs' allegations are proven true, I have determined that the artificial inflation in Twitter's stock price at the start of the Class Period was at least \$20.34 per share to reflect this adverse information.¹⁴¹ The artificial inflation that dissipated on each alleged corrective disclosure event is measured by the stock price declines following corrective disclosures, after removing the effects of potentially confounding information. The computation of the inflation ribbon is described below.

1. Corrective Disclosures and the Dissipation of Artificial Inflation

158. The following explains how the inflation ribbon, the time series of artificial inflation in the stock price, is constructed using the residual price declines observed following the corrective disclosures, after removing the effects of potentially confounding information.
159. Exhibit-8 presents the inflation ribbon described herein.

a. *Dissipation of Inflation on 3 August 2015*

160. No artificial inflation remained in the stock price after the close of trading on 3 August 2015.
161. On 3 August 2015, the residual decline in Twitter's stock price was \$1.65 per share. As explained above, the amount of artificial inflation that reasonably dissipated due to the market's continued reassessment of the final corrective disclosure was \$1.65. Therefore, just prior to 3 August 2015, the artificial inflation in the Twitter stock price was \$1.65 per share.

¹⁴¹ If the trier of fact determines that Twitter's stock price fully reflected the valuation impact of the corrective disclosures at the close of trading on 29 July 2015 (and subsequent losses are not recoverable), per share damages would range up to \$18.33 per share, depending on the timing of the stock purchase and sale. This alternative inflation ribbon is presented in Exhibit-9.

b. Inflation From 31 July 2015 through 2 August 2015

162. I identified no inflationary or deflationary events occurring between the close of trading on 31 July 2015 and 2 August 2015. Therefore, during this interval (from the close of trading on 31 July 2015 through 2 August 2015), artificial inflation was \$1.65 per share.

c. Dissipation of Inflation on 31 July 2015

163. On 31 July 2015, the residual decline in Twitter's stock price was \$0.42 per share. As explained above, the amount of artificial inflation that reasonably dissipated due to the market's continued reassessment of the final corrective disclosure was \$0.42.
164. Therefore, just prior to 31 July 2015, the artificial inflation in the Twitter stock price was \$2.07 per share, equal to the \$0.42 per share of artificial inflation that dissipated that day, plus the \$1.65 per share that remained afterwards and dissipated later.

d. Inflation From 29 July 2015 through 31 July 2015

165. I identified no inflationary or deflationary events occurring between the close of trading on 29 July 2015 and 31 July 2015. On 30 July 2015, the residual Twitter stock price return was positive \$0.06 per share. As shown below, this positive stock price return is not individually treated as an inflationary or deflationary event, but is conservatively removed from the dissipation of inflation on 29 July 2015. Therefore, during the interval from the close of trading on 29 July 2015 through 31 July 2015 artificial inflation was \$2.07 per share.

e. Dissipation of Inflation on 29 July 2015

166. No artificial inflation remained in the stock price after the close of trading on 29 July 2015, the trading session following the final corrective disclosure.
167. On 29 July 2015, the residual decline in Twitter's stock price was \$5.40 per share. As explained above, the amount of artificial inflation that dissipated that day due to the corrective disclosure was \$5.40. However, there was a residual share price recovery of \$0.06 the following trading date, 30 July 2015. As such, the amount of artificial inflation that dissipated due to the corrective disclosure was \$5.34 per share (equal to the \$5.40 stock price decline on 29 July 2015, less the \$0.06 share price recovery on 30 July 2015).

168. Therefore, just prior to 29 July 2015, the artificial inflation in the Twitter stock price was \$7.41 per share, equal to the \$5.34 per share of artificial inflation that dissipated that day, plus the \$2.07 per share that remained afterwards and dissipated later.

f. Inflation From 29 April 2015 Through 28 July 2015

169. I identified no inflationary or deflationary events occurring between the 29 April 2015 partially corrective disclosure event and the 28 July 2015 (after the close of trading) final corrective disclosure. Therefore, during this interval (from the close of trading on 29 April 2015 through the close of trading on 28 July 2015), artificial inflation was \$7.41 per share.

g. Dissipation of Inflation on 29 April 2015

170. On 29 April 2015, the residual decline in Twitter's stock price was \$3.96 per share. As explained above, the amount of artificial inflation that dissipated due to the corrective disclosure was \$3.96.
171. Therefore, just prior to 29 April 2015, the artificial inflation in the Twitter stock price was \$11.37 per share, equal to the \$3.96 per share of artificial inflation that dissipated that day, plus the \$7.41 per share that remained afterwards and dissipated later.

h. Dissipation of Inflation on 28 April 2015

172. On 28 April 2015, the residual decline in Twitter's stock price was \$9.02 per share. As explained above, the Twitter stock price decline on that day attributable to potentially confounding information was \$0.05 per share. As such, the amount of artificial inflation that dissipated due to the corrective disclosure was \$8.97 (equal to \$9.02 minus \$0.05). Therefore, just prior to 28 April 2015, the artificial inflation in the Twitter stock price was \$20.34 per share, equal to the \$8.97 per share of artificial inflation that dissipated that day, plus the \$11.37 per share that remained afterwards and dissipated later.

i. Inflation From 6 February 2015 Through 27 April 2015

173. I identified no inflationary or deflationary events occurring between the start of the Class Period on 6 February 2015 and the 28 April 2015 partially corrective disclosure. Therefore, during this interval (including 6 February 2015, but excluding 28 April 2015), artificial inflation was \$20.34 per share.

B. Per-Share Damages Formula For Twitter Stock

174. The measure of per share damages traditionally applied in 10b-5 cases is the difference between the actual purchase price of the security and what would have been the purchase price of the security had there been no alleged fraud.

“[M]any courts have adopted the out-of-pocket rule as the traditional measure of damages in Rule 10b-5 cases. The out-of-pocket measure rule defines damages as ‘the difference between the contract price, or the price paid, and the real or actual value at the date of the sale, together with such outlays as are attributable to the defendant’s conduct. Or, in other words, the difference between the amount parted with and the value of the thing received.’ Typically, courts measure this as the plaintiff’s purchase price less the true value at the time of the transaction. The true value is the price of the security in the absence of fraud or misrepresentation.”

“Federal Securities Acts and Areas of Expert Analysis,” by Nicholas Crew, et al., in Chapter 27 of the *Litigation Services Handbook: The Role of the Financial Expert*, 6th edition, edited by Roman Weil, Daniel Lentz, and Elizabeth Evans, John Wiley & Sons, Inc., 2017, p. 27.6 (internal citations omitted).

175. The difference between what a security’s price actually was at a point in time, and what the price would have been absent the alleged fraud is called “artificial inflation.”
176. The Supreme Court, in *Dura Pharmaceuticals, Inc. v. Broudo*, 544 U.S. 336 (2005), clarified that recoverable damages are not the entire amount by which an investor overpaid for a security on account of fraud, but how much of that artificial inflation was actually lost by the investor during his/her holding period. Therefore, recoverable damages are the amount by which fraud-induced inflation dissipated after the investors’ purchase, subject to adjustment if the investor sold the security during or after the 90-day bounce-back period (discussed below).

177. The Private Securities Litigation Reform Act of 1995 imposes another limitation on damages:

“[T]he award of damages to the plaintiff shall not exceed the difference between the purchase or sale price paid or received, as appropriate, by the plaintiff for the subject security and the mean trading price of that security during the 90-day period beginning on the date on which the information correcting the misstatement or omission that is the basis for the action is disseminated to the market.”

15 U.S.C. § 78u-4(e) (1).

178. For Class members who sell within that 90-day period, the limitation on damages is “the difference between the purchase or sale price paid or received” and “the mean trading price of the security during the period beginning immediately after dissemination of information correcting the misstatement or omission and ending on the date on which” the security is sold.¹⁴²
179. As the final corrective disclosure in this case took place on 28 July 2015 (after the close of trading), the 90-day bounce-back period stretches from 3 August 2015 through 30 October 2015. The average price for Twitter stock over this period of 90 calendar days, based on closing prices, was \$28.06 per share. Exhibit-10 presents Twitter’s stock prices from 29 July 2015 through 30 October 2015.¹⁴³
180. Under the PSLRA 1995, the investment loss cap for a share sold *within* the 90-day bounce-back period is a function of the average trading price from the date of final corrective disclosure to the date of actual sale.

“[I]f the plaintiff sells or repurchases the subject security prior to the expiration of the 90-day period described in paragraph (1), the plaintiff’s damages shall not exceed the difference between the purchase or sale price paid or received, as appropriate, by the plaintiff for the security and the

¹⁴² 15 U.S.C. Section 78u-4(e) (2).

¹⁴³ Exhibit-10 also presents the Twitter’s stock average closing prices through 26 October 2015, which is the last date of the 90-day window if the finder of fact determines that Plaintiffs’ alternative inflation ribbon is a more appropriate basis for computing out-of-pocket damages in this matter.

mean trading price of the security during the period beginning immediately after dissemination of information correcting the misstatement or omission and ending on the date on which the plaintiff sells or repurchases the security.”

15 U.S.C. § 78u-4(e) (2).

181. Thus, damages on any share purchased during the Class Period and sold within 90 days of the final corrective disclosure is the lesser of the reduction in the dollar inflation over the investor’s holding period (the economic/inflation loss) or the decline in the stock price (the investment loss), where the terminal stock price is deemed to be the average price from the final corrective disclosure date to the sale date.
182. As an example of how per share damages are computed for a particular investor, consider an investor who purchased Twitter stock on 1 April 2015 for \$50.47 per share and sold those shares at the close of trading on 4 August 2015 for \$29.34 per share. The inflation on 1 April 2015 was \$20.34 per share, and at the close of trading on 4 August 2015 it was \$0 per share. According to the change in inflation, this investor’s economic/inflation loss is \$20.34 per share, equal to the decline in inflation over his holding period (\$20.34 minus \$0). The investment loss is \$21.13 per share, equal to the \$50.47 per share purchase price minus the \$29.34 per share sale price. The per share damages are the lesser of the economic/inflation loss and the investment loss, which is \$20.34 per share.
183. Based on the foregoing analysis and statutory formulas, Rule 10b-5 damages per share range up to \$20.34 per share, excluding prejudgment interest. A particular investor’s per share damages depends on when during the Class Period each share was purchased and if and when each respective share was subsequently sold. Investors who purchased on or after the start of trading on 29 July 2015, or sold their shares prior to 28 April 2015, suffered no recoverable damages on those shares.
184. I understand that the partial leak of the Company’s Q1 2015 financial results is the first alleged corrective disclosure in this case, and that these results were leaked beginning at 3:07 PM EST on 28 April 2015. Therefore, investors who sold their shares prior to 3:07 PM EST on 28 April 2015 also suffered no recoverable losses on those shares.

VI. LIMITING FACTORS AND OTHER ASSUMPTIONS

185. This report is furnished solely for the purpose of court proceedings in the above referenced matter and may not be used or referred to for any other purpose. The analysis and opinions contained in this report are based on information available as of the date of this report. I reserve the right to supplement or amend this report, including in the event additional information becomes available.



Steven P. Feinstein, Ph.D., CFA

Exhibit-1

**Documents and Other Information Considered
In Addition to those Cited in the Feinstein Report**

CASE DOCUMENTS

- Order Granting Class Certification, Appointment of Class Representatives, And Approval of Class Counsel, filed 17 July 2018.

DEPOSITIONS

- Deposition of Ethan Yeh, dated 10 December 2018.
- Deposition of Jeff Dejelo, dated 8 January 2019.
- Deposition of Austin Johnsen, dated 22 February 2019.

DOCUMENTS PROVIDED BY PLAINTIFFS

- AR_01062015.
- AR_02012015.
- AR_03012015_001.
- AR_03012015_002.
- AR_03012015_003.
- AR_04282015.
- AR_07282015.
- AR_10282014.
- AR_11012014.
- BARC_000767.
- BARC_000805.
- GS_0001397.
- Johnsen Deposition, Exhibit 255.
- RBC_TWTR0002904.
- RBC_TWTR0003332.
- RBC_TWTR0003346.
- RBC_TWTR0003386.
- RBC_TWTR0003389.
- RBC_TWTR0003391.
- RBC_TWTR0003401.
- RBC_TWTR0003404.
- RBC_TWTR0003410.
- RBC_TWTR0003413.

Exhibit-1

**Documents and Other Information Considered
In Addition to those Cited in the Feinstein Report**

- RBC_TWTR0003472.
- RBC_TWTR0003474.
- RBC_TWTR0003481.
- RBC_TWTR0003484.
- RBC_TWTR0003487.
- RBC_TWTR0003497.
- RBC_TWTR0003995.
- Rivihus Deposition, Exhibit 78.
- Rivihus Deposition, Exhibit 92.
- RSI000623.
- RSI000628.
- RSI000633.
- RSI000771.
- RSI000774.
- RSI000777.
- RSI000781.
- RSI000785.
- RSI000840.
- RSI000850.
- RSI000854.
- RSI000860.
- RSI000866.
- RSI000872.
- RSI001040.
- RSI001098.
- RSI001105.
- RSI001158.
- RSI001255.
- RSI001265.
- RSI001271.
- RSI001368.
- RSI001384.
- SVC_0000661.
- SVC_0013443.
- TWTR_SHEN_00000168.
- TWTR_SHEN_00004748.
- TWTR_SHEN_00006118.
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Exhibit-1

**Documents and Other Information Considered
In Addition to those Cited in the Feinstein Report**

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- TWTR_SHEN_00027075.
- TWTR_SHEN_00027076.
- TWTR_SHEN_00081990.
- TWTR_SHEN_00087974.
- TWTR_SHEN_00089420.
- TWTR_SHEN_00089815.
- TWTR_SHEN_00089851.
- TWTR_SHEN_00089890.
- TWTR_SHEN_00089964.
- TWTR_SHEN_00092862.
- TWTR_SHEN_00097773.
- TWTR_SHEN_00101719.
- TWTR_SHEN_00105467.
- TWTR_SHEN_00105562.
- TWTR_SHEN_00105565.
- TWTR_SHEN_00105815.
- TWTR_SHEN_00111007.
- TWTR_SHEN_00111021.
- TWTR_SHEN_00111026.
- TWTR_SHEN_00117611.
- TWTR_SHEN_00119162.
- TWTR_SHEN_00119177.
- TWTR_SHEN_00121050.
- TWTR_SHEN_00121057.
- TWTR_SHEN_00121060.
- TWTR_SHEN_00121062.
- TWTR_SHEN_00121064.
- TWTR_SHEN_00121069.
- TWTR_SHEN_00121079.
- TWTR_SHEN_00121082.
- TWTR_SHEN_00121085.
- TWTR_SHEN_00121088.
- TWTR_SHEN_00121090.
- TWTR_SHEN_00121102.
- TWTR_SHEN_00121105.
- TWTR_SHEN_00121107.
- TWTR_SHEN_00121114.

Exhibit-1

**Documents and Other Information Considered
In Addition to those Cited in the Feinstein Report**

- TWTR_SHEN_00121116.
- TWTR_SHEN_00121153.
- TWTR_SHEN_00121224.
- TWTR_SHEN_00152498.
- TWTR_SHEN_00152499.
- TWTR_SHEN_00152507.
- TWTR_SHEN_00152508.
- TWTR_SHEN_00152535.
- TWTR_SHEN_00152536.
- TWTR_SHEN_00180313.
- TWTR_SHEN_00182206.
- TWTR_SHEN_00182213.
- TWTR_SHEN_00182950.
- TWTR_SHEN_00186799.
- TWTR_SHEN_00192754.
- TWTR_SHEN_00193633.
- TWTR_SHEN_00193706.
- TWTR_SHEN_00204581.
- TWTR_SHEN_00205159.
- TWTR_SHEN_00208832.
- TWTR_SHEN_00228377.
- TWTR_SHEN_00228867.
- TWTR_SHEN_00228868.
- TWTR_SHEN_00228874.
- TWTR_SHEN_00230532.
- TWTR_SHEN_00230547.
- TWTR_SHEN_00230548.
- TWTR_SHEN_00230554.
- TWTR_SHEN_00234873.
- TWTR_SHEN_00237191.
- TWTR_SHEN_00242536.
- TWTR_SHEN_00242668.
- TWTR_SHEN_00245052.
- TWTR_SHEN_00252876.
- TWTR_SHEN_00252894.
- TWTR_SHEN_00252907.
- TWTR_SHEN_00252949.
- TWTR_SHEN_00252971.

Exhibit-1

**Documents and Other Information Considered
In Addition to those Cited in the Feinstein Report**

- TWTR_SHEN_00252980.
- TWTR_SHEN_00252992.
- TWTR_SHEN_00253062.
- TWTR_SHEN_00257825.
- TWTR_SHEN_00259830.
- TWTR_SHEN_00260922.
- TWTR_SHEN_00260938.
- TWTR_SHEN_00262747.
- TWTR_SHEN_00262763.
- TWTR_SHEN_00274872.
- TWTR_SHEN_00276838.
- TWTR_SHEN_00293833.
- TWTR_SHEN_00293860.
- TWTR_SHEN_00295047.
- TWTR_SHEN_00295061.
- TWTR_SHEN_00295064.
- TWTR_SHEN_00295575.
- TWTR_SHEN_00295798.
- TWTR_SHEN_00295801.
- TWTR_SHEN_00295810.
- TWTR_SHEN_00295843.
- TWTR_SHEN_00295864.
- TWTR_SHEN_00295877.
- TWTR_SHEN_00295922.
- TWTR_SHEN_00296853.
- TWTR_SHEN_00296857.
- TWTR_SHEN_00297062.
- TWTR_SHEN_00297067.
- TWTR_SHEN_00297069.
- TWTR_SHEN_00297384.
- TWTR_SHEN_00298644.
- TWTR_SHEN_00299362.
- TWTR_SHEN_00319785.
- TWTR_SHEN_00319903.
- TWTR_SHEN_00319909.
- TWTR_SHEN_00320104.
- TWTR_SHEN_00324843.
- TWTR_SHEN_00327028.

Exhibit-1

**Documents and Other Information Considered
In Addition to those Cited in the Feinstein Report**

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- TWTR_SHEN_00327976.
- TWTR_SHEN_00328186.
- TWTR_SHEN_00328375.
- TWTR_SHEN_00328376.
- TWTR_SHEN_00328805.
- TWTR_SHEN_00328978.
- TWTR_SHEN_00329018.
- TWTR_SHEN_00329024.
- TWTR_SHEN_00329060.
- TWTR_SHEN_00329161.
- TWTR_SHEN_00329162.
- TWTR_SHEN_00330251.
- TWTR_SHEN_00330811.
- TWTR_SHEN_00330841.
- TWTR_SHEN_00330846.
- TWTR_SHEN_00333184.
- TWTR_SHEN_00342546.
- TWTR_SHEN_00345169.
- TWTR_SHEN_00346803.
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- TWTR_SHEN_00347125.
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- “Twitter Shares Hit Record Low Amid Growth Concerns,” *RTT News*, 4 August 2015.
- “Twitter Shares Hit New Low Amid Old Concerns,” by Paul Vigna, *The Wall Street Journal*, 5 August 2015, 1:33 PM.

ACADEMIC AND PROFESSIONAL LITERATURE

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- Bruner, Robert F., “Does M&A Pay? A Survey of Evidence for the Decision-Maker,” *Journal of Applied Finance*, Spring/Summer 2002.

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**Documents and Other Information Considered
In Addition to those Cited in the Feinstein Report**

- Crew, Nicholas, et al., “Federal Securities Acts and Areas of Expert Analysis,” in Chapter 27 of the *Litigation Services Handbook: The Role of the Financial Expert*, 6th ed., edited by Roman Weil, Daniel Lentz, and Elizabeth Evans, John Wiley & Sons, Inc., 2017.
- Damodaran, Aswath, *Investment Valuation*, 3rd ed., Wiley Finance, 2012.
- Davies, Peter and Michael Canes, “Stock Prices and the Publication of Second-Hand Information,” *Journal of Business*, vol 51, no. 1, 1978.
- Ferris, Kenneth and Barbara Pecherot Petit, *Valuation: Avoiding the Winner’s Curse*, Prentice-Hall, Upper Saddle River, 2002.
- Hirshleifer, David, Sonya Seongyeon Lim, and Siew Hong Teoh, “Driven to Distraction: Extraneous Events and Underreaction to Earnings News,” *Journal of Finance*, vol 64, October 2009.
- MacKinlay, A. Craig, “Event Studies in Economics and Finance,” *Journal of Economic Literature*, March 1997.
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- Tabak, David I. and Frederick C. Dunbar, “Materiality and Magnitude: Event Studies in the Courtroom,” in *Litigation Services Handbook, The Role of the Financial Expert*, 3rd ed., edited by Roman L. Weil, Michael J. Wagner, and Peter B. Frank, John Wiley & Sons, Inc., 2001.

CONFERENCE CALLS

- “Twitter, Inc. Analyst Day,” *Factset:callstreet*, corrected transcript, 12 November 2014.

DATA AND DATABASES

- Bloomberg
- Capital IQ
- CRSP (Center for Research in Security Prices)
- Factiva
- FactSet
- TAQ
- Thomson Eikon
- Twitter

Exhibit-1

**Documents and Other Information Considered
In Addition to those Cited in the Feinstein Report**

LEGAL CASES

- *Dura Pharmaceuticals, Inc. v. Broudo*, 544 U.S. 336 (2005).

TWEETS

- “#BREAKING: Twitter \$TWTR Q1 Revenue misses estimates, \$436M vs. \$456.52M expected.” Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.
- “#BREAKING: Twitter \$TWTR Q1 Average Monthly Active Users (MAUs) 302M inline with expectations.” Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.
- “#BREAKING: Twitter \$TWTR Q1 Mobile Monthly Active Users (MAUs) misses estimates, 241.6M vs. 243M expected.” Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.
- “#BREAKING: Twitter Inc. \$TWTR Q1 Non-GAAP EPS beats estimates, \$0.07 vs. \$0.04 expected.” Selerity (@Selerity), Tweet, 28 April 2015, 3:07 PM.
- “Today’s \$TWTR earnings release was sourced from Twitter’s Investor Relations website investor.twitterinc.com. No leak. No hack.” Selerity (@Selerity), Tweet, 28 April 2015, 3:34 PM.

OTHER

- “Reference Guide on Estimation of Economic Damages,” *Reference Manual on Scientific Evidence*, 3rd Edition, 2011.
- Private Securities Litigation Reform Act of 1995, 15 U.S.C. §78u-4.
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- www.cnbc.com/video/2015/08/03/twitter-needs-more-than-just-a-new-ceo-analyst.html.
- Any other documents and data cited in the report.

Exhibit-2
Curriculum Vitae
Steven P. Feinstein, Ph.D., CFA

Babson College
Finance Division
Babson Park, MA 02457
781-239-5275
Feinstein@Babson.edu

EDUCATION

- 1989 YALE UNIVERSITY
Ph.D. in Economics (Concentration in Finance)
- 1986 YALE UNIVERSITY
M.Phil. in Economics
- 1983 YALE UNIVERSITY
M.A. in Economics
- 1981 POMONA COLLEGE
B.A. in Economics (Phi Beta Kappa, *cum laude*)

TEACHING EXPERIENCE

- 1996 - present BABSON COLLEGE
Babson Park, MA
Full-time Faculty, Finance Division
Associate Professor (2000-present)
Donald P. Babson Chair in Applied Investments (2002-2010)
Faculty Director of the Babson College Fund (2002-2009)
Director of the Stephen D. Cutler Investment Management Center
(2002-2007)
Assistant Professor (1996-2000)
- 1990 - 1995 BOSTON UNIVERSITY SCHOOL OF MANAGEMENT
Boston, MA
Full-time Faculty, Department of Finance
- 1993 - 1994 WASHINGTON UNIVERSITY, OLIN SCHOOL OF BUSINESS
St. Louis, MO
Visiting Assistant Professor, Department of Finance

Exhibit-2
Curriculum Vitae
Steven P. Feinstein, Ph.D., CFA

BUSINESS EXPERIENCE

2008 - present	CROWNINSHIELD FINANCIAL RESEARCH, INC. Brookline, MA President and Senior Expert
1996 - 2008	THE MICHEL-SHAKED GROUP Boston, MA Senior Expert (2001 - 2008) Affiliated Expert (1996 - 2001)
1987 - 1990	FEDERAL RESERVE BANK OF ATLANTA Economist

PROFESSIONAL DESIGNATIONS

1998 Awarded the Chartered Financial Analyst designation by the Association for Investment Management and Research.

RESEARCH AWARDS

1999 Greater Boston Real Estate Board/Real Estate Finance Association – Research Grant and Featured Speaker at Real Estate Finance Association Meetings.

PAPERS AND PUBLICATIONS

“What A Solar Eclipse Has To Do With Market Efficiency,” (with Daniel Bettencourt) *Law360.com*, 2017.

“Underestimation of Securities Fraud Aggregate Damages Due to Inter-Fund Trades,” (with Gang Hu, Mark Marcus, and Zann Ali) *Journal of Forensic Economics*, September 2013, Vol. 24, No. 2, 161-173.

“Lehman Equity Research Tipping: Evidence in the Stock Price Data,” Working paper, March 2010. Cited in *New York Times* May 19, 2012, and made available on the *New York Times* website.

“Distortion in Corporate Valuation: Implications of Capital Structure Changes,” (with Allen Michel and Jacob Oded) *Managerial Finance*, 2011, Vol. 37(8), 681-696.

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Steven P. Feinstein, Ph.D., CFA

“Market Signals of Investment Unsuitability,” (with Alexander Liss and Steven Achatz) Law360.com, June 3, 2010. Available from <http://www.law360.com/articles/170690>.

“Planning Capital Expenditure,” in *The Portable MBA in Financing and Accounting*, J. L. Livingstone and T. Grossman, editors, New York: Wiley, 3rd edition 2001, and 4th edition 2009.

“Financial Management of Risks,” in *The Portable MBA in Financing and Accounting*, J. L. Livingstone and T. Grossman, editors, New York: Wiley, 2nd edition 1997, 3rd edition 2001, and 4th edition 2009.

“Fraud-on-the-Market Theory: Is a Market Efficient?” (with Allen Michel and Israel Shaked) *American Bankruptcy Institute Journal*, May 2005.

“Valuation of Credit Guarantees,” (with Allen J. Michel and Israel Shaked). *Journal of Forensic Economics* 17(1), pp. 17-37, 2005.

“A Better Understanding of why NPV Undervalues Managerial Flexibility,” (with Diane Lander) in *The Engineering Economist*, 2002, Volume 47, Number 4.

“Teaching the Strong-Form Efficient Market Hypothesis: A Classroom Experiment,” *Journal of Financial Education*, fall 2000.

A Future for Real Estate Futures: Potential Applications of Derivatives in Real Estate Investment and Finance (with Linda Stoller). Monograph. Boston: Real Estate Finance Association / Greater Boston Real Estate Board, May 2000.

“The Risk Budget: Using Your Human Resources,” (with John Marthinsen and John Edmunds) *Risk Management*, April 2000.

“Scenario Learning: A Powerful Tool for the 21st Century Planner,” (with Jeffrey Ellis and Dennis Stearns) *The Journal of Financial Planning*, April 2000.

“Protecting Future Product Liability Claimants in the Case of Bankruptcy,” (with Allen Michel and Israel Shaked) *American Bankruptcy Institute Journal*, January 2000.

“Measuring Risk with the Bodie Put When Stocks Exhibit Mean Reversion,” *The Journal of Risk*, Vol. 1, No. 3, 1999.

“Just-in-Time Mathematics: Integrating the Teaching of Finance Theory and Mathematics,” (with Gordon Prichett) *Primus*, Vol. IX, No. 2, June 1999.

Atlanta Park Medical Center v. Hamlin Asset Management. (with Natalie Taylor). Babson Case Collection, Harvard Business School Press, 1998.

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Curriculum Vitae
Steven P. Feinstein, Ph.D., CFA

“Dealing with Delta,” *Derivatives Week*, VII, No. 44, November 2, 1998.

“Expected Return in Option Pricing: A Non-Mathematical Explanation,” *Derivatives Week*, VII, No. 35, August 31, 1998.

“When Hedges Fail: The Put Paradox and its Solution,” *Derivatives Quarterly*, Vol. 4, No. 2, Winter 1997.

Finance and Accounting for Project Management. New York: American Management Association, 1996.

“International Investing,” in *Irwin’s Directory of Emerging Market Brokerages*. New York: Irwin, 1996.

“The Hull and White Implied Volatility,” Boston University Working Paper #92-51, 1992.

“Immunizing Against Interest Rate Risk Using the Macaulay Duration Statistic: An Assessment,” (with Don Smith) in *Financial Systems and Risk Management*, the proceedings of the US-Japan Forum on Financial Strategy in the 1990s, sponsored by Osaka Foundation of International Exchange and Boston University, August 1991.

“Covered Call Options: A Proposal to Ease LDC Debt,” (with Peter Abken) *Federal Reserve Bank of Atlanta Economic Review*, March/April 1990. Reprinted in *Financial Derivatives: New Instruments and Their Uses*. Atlanta: Federal Reserve Bank.

“Forecasting Stock-Market Volatility Using Options on Index Futures,” *Federal Reserve Bank of Atlanta Economic Review*, May/June 1989. Reprinted in *Financial Derivatives: New Instruments and Their Uses*. Atlanta: Federal Reserve Bank.

“The Black-Scholes Formula is Nearly Linear in Sigma for At-the-Money Options; Therefore Implied Volatilities from At-the-Money Options are Virtually Unbiased,” Federal Reserve Bank of Atlanta Working Paper #88-9, December 1988.

“The Effect of the ‘Triple Witching Hour’ on Stock Market Volatility,” (with William Goetzmann) *Federal Reserve Bank of Atlanta Economic Review*, September/October 1988. Reprinted in *Financial Derivatives: New Instruments and Their Uses*. Atlanta: Federal Reserve Bank.

“Stock Market Volatility,” *Federal Reserve Bank of Atlanta Economic Review*, November/December 1987.

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Curriculum Vitae
Steven P. Feinstein, Ph.D., CFA

Book review of *In Who's Interest: International Banking and American Foreign Policy*, by Benjamin J. Cohen, Yale University Press, in *Federal Reserve Bank of Atlanta Economic Review*, Summer 1987.

PRESENTATIONS

“Stock Price Reactivity to Earnings Announcements: A Cross-Sectional Analysis of the *Cammer/Krogman* Factors,” (with Miguel Villanueva) at the Boston Area Finance Symposium, April 2018.

“Stock Price Reactivity to Earnings Announcements: A Cross-Sectional Analysis of the *Cammer/Krogman* Factors,” (with Miguel Villanueva) at the Eastern Finance Association Conference, April 2018.

“Determining the Defendant's Ability to Pay,” at Taxpayers Against Fraud Education Fund Conference, October 2010.

“The Computation of Damages in Securities Fraud Cases,” at the Grant and Eisenhower Institutional Investor Conference, December 2002.

“The Role of the Financial Expert in Complex Litigation,” at the Financial Management Association Conference, October 2000.

“Entrepreneurial Incentives and Resource Allocation Among Corporate Venturing Initiatives,” (with Joel Shulman and U. Srinivasa Rangan), Babson Entrepreneurship Research Conference, May 2000.

“Application of Real Options in Purchasing Strategies,” (with Juan Orozco), presented at the International Applied Business Research Conference, March 2000.

“A Future for Real Estate Futures,” (with Linda Stoller) at the Fairfield County chapter of the Real Estate Finance Association, November 1999, and at the Greater Boston Real Estate Board, November 2000.

“Atlanta Park Medical Center v. Hamlin Asset Management,” (with Natalie Taylor) at the 1999 convention of the North American Case Research Association.

“Using Future Worlds™ in the Financial Planning Process,” (with Jeffrey Ellis) at the Institute of Certified Financial Planners Masters Retreat, October 1999.

Exhibit-2
Curriculum Vitae
Steven P. Feinstein, Ph.D., CFA

“Toward a Better Understanding of Real Options: A Weighted Average Discount Rate Approach,” at the 1999 Financial Management Association Conference, the 1999 European Financial Management Association Conference, and the 1999 Multinational Finance Society Conference.

“Just-In-Time Mathematics: Integrating the Teaching of Finance Theory and Mathematics,” (with Gordon Prichett) at the 1999 Financial Management Association Conference.

“Alternative Dow Investments for the Individual Investor: Diamonds, Synthetics, and the Real Thing,” at the 1999 Academy of Financial Services Convention.

“Evidence of Yield Burning in Municipal Refundings,” at Financial Management Association Convention, October 1997; Government Finance Officers Association, 1997; and Northeast Regional Convention of the National Association of State Treasurers, 1997.

“Teaching the Strong-Form Efficient Market Hypothesis,” at Conference on Classroom Experiments in the Teaching of Economics at University of Virginia, September 1995.

“Efficient Consolidation of Implied Standard Deviations,” (with Shaikh Hamid) at Midwest Finance Association, March 1995.

“A Test of Intertemporal Averaging of Implied Volatilities,” (with Shaikh Hamid) at Eastern Finance Association, April 1995.

“Taking Advantage of Volatility: Non-linear Forecasting and Options Strategies,” (with Hassan Ahmed) at Chicago Board of Trade / Chicago Board Options Exchange Conference on Risk Management, February 1992.

“Immunizing Against Interest Rate Risk Using the Macaulay Duration Statistic: An Assessment,” (with Don Smith) at Japan-U.S. Conference on Financial Strategies in the 1990s, Osaka, Japan, August 1991.

“The Hull and White Implied Volatility,” at American Finance Association Convention, December 1990.

REVIEWED ARTICLES AND BOOKS FOR:

Harvard Business School Publishing
Elsevier
Journal of Economic Education
Journal of Forensic Economics
Journal of Risk

Exhibit-2
Curriculum Vitae
Steven P. Feinstein, Ph.D., CFA

Financial Review
North American Case Research Association
Financial Management
Journal of Business
Journal of Money, Credit and Banking
Quarterly Review of Economics and Finance
Blackwell
Prentice Hall
Southwestern Publishing

COURSES TAUGHT

Capital Markets
Mod B: Decision Making and Applications, Finance stream (MBA)
Financial Reporting and Corporate Finance (MBA)
Valuation (MBA)
Investments (MBA and Executive)
Equity Markets (MBA)
Fixed Income Analysis (Undergraduate and MBA)
Babson College Fund (Undergraduate and MBA)
Options and Futures (Undergraduate)
Advanced Derivative Securities (MBA)
Corporate Finance (MBA and Executive)
Financial Management (MBA)
Risk Management (MBA)
Corporate Financial Strategy (MBA)
Integrated Management (Undergraduate)
Cross-Functional Management (Integrated curriculum, Undergraduate)
Continuous-Time Finance (Doctoral)
Portfolio Theory / Management Information Systems (Executive)
Quantitative Methods for Investment Management (Undergraduate and MBA)
Introduction to Derivative Securities (Executive)
International Finance (Executive)

TEACHING AWARDS

Reid Teaching Award, Washington University, Olin School of Business, 1993-94.

Exhibit-2
Curriculum Vitae
Steven P. Feinstein, Ph.D., CFA

SELECT LIST OF MEDIA CITATIONS

“Is Insider Trading Part of the Fabric?” by Gretchen Morgenson, *The New York Times*, May 19, 2012.

“Bankers Rigging Municipal Contract Bids Admit to Cover-Up Lies,” by William Selway and Martin Z. Braun, *Bloomberg Markets Magazine*, November 24, 2010.

“Hospital Move Presents Buy-Out Groups with New Risks,” by Francesco Guerra, Christopher Bowe, and Rebecca Knight, *Financial Times*, July 15, 2006.

“Funds of Knowledge Add Value,” by Rebecca Knight, *Financial Times*, March 12, 2006.

“City’s Financial Picture Worse Than Ever, Sanders Says,” by Matthew T. Hall, *San Diego Union-Tribune*, January 7, 2006.

“Downer: Stock Market Takes Another Dive,” by John Chesto, *Boston Herald*, July 23, 2002.

“Banks, Developers, Are Main Beneficiaries,” [editorial column] by Steven Feinstein, *The Boston Globe*, March 31, 2002, p. C4.

“Washington Investing: What Michael Saylor is Really Worth,” by Jerry Knight, *The Washington Post*, March 6, 2000.

“IBM Retools Pensions,” by Stephanie Armour, *USA Today*, May 4, 1999.

“L.A. MTA’s Law Firm Says Lissack Strategy Will be a Replay,” by Andrea Figler, *Bond Buyer*, September 30, 1998.

“Fed Key Player in Rescue of Floundering Hedge Fund,” by Andrew Fraser, Associated Press, September 25, 1998.

“Top Banks Plan Bailout for Fund,” by Andrew Fraser, Associated Press, September 24, 1998.

“Clarion Call to the Small Investor,” by Jo-Ann Johnston, *The Boston Globe*, March 4, 1998.

“L.A. Authority Study Shows Rampant Yield Burning Abuse,” by Michael Stanton, *The Bond Buyer*, April 22, 1997.

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Steven P. Feinstein, Ph.D., CFA

“Dispute Over Yield Burning Dominates GFOA Session,” by Michael Stanton, *The Bond Buyer*, January 29, 1997.

“Men Behaving Badly (Yield Burning),” *Grants Municipal Bond Observer*, January 24, 1997.

“Municipal Bond Dealers Face Scrutiny,” by Peter Truell, *The New York Times*, December 17, 1996.

“Iowa Market Takes Stock of Presidential Candidates,” by Stanley W. Angrist, *The Wall Street Journal*, August 28, 1995.

“Looking for Clues in Options Prices,” by Sylvia Nasar, *The New York Times*, July 18, 1991.

“For Fed, A New Set of Tea Leaves,” by Sylvia Nasar, *The New York Times*, July 5, 1991.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Finance Association
CFA Society Boston
Chartered Financial Analyst Institute
Financial Management Association
Foundation for Advancement of Research in Financial Economics (founding member)
National Association of Forensic Economics
North American Case Research Association

Exhibit-3

Steven P. Feinstein, Ph.D., CFA
Testimony provided since the Feinstein Report

In Re Federal Home Loan Mortgage Corporation Securities Litigation
Master File No. 4:08-cv-00160-BYP
United States District Court
Northern District of Ohio Eastern Division
Deposition Testimony
August 2017
Deposition Testimony
November 2017
Testimony at Evidentiary Hearing
April 2018

In re BHP Billiton Limited Securities Litigation
Civil Action No. 1:16-cv-01445-NRB
United States District Court
Southern District New York
Deposition Testimony
April 2018

In Re Medtronic, Inc. Securities Litigation
Master File No. 0:13-cv-01686-JRT-FLN
United States District Court
District of Minnesota
Deposition Testimony
May 2018

In Re Community Health Systems Securities Litigation
Case No. 11-cv-0433
United States District Court
Middle District of Tennessee
Deposition Testimony
June 2018

In Re Orbital ATK, Inc. Securities Litigation
Case No. 1:16-cv-01031-TSE-MSN
United States District Court
Eastern District of Virginia
Deposition Testimony
July 2018

Exhibit-3

Steven P. Feinstein, Ph.D., CFA
Testimony provided since the Feinstein Report

In Re Correction Corporation of America Securities Litigation
Case No. 3:16-cv-02267
United States District Court
Middle District of Tennessee
Deposition Testimony
July 2018

In Re Blackberry Limited Securities Litigation
Case No. 1:13-cv-7060-TPG
United States District Court
Southern District of New York
Deposition Testimony
July 2018

In Re SunEdison, Inc. Securities Litigation
Case No. 16-md-2742-PKC
United States District Court
Southern District of New York
Deposition Testimony
July 2018

In Re Flower Foods, Inc. Securities Litigation
Case No. 7:16-CV-00222-WLS
United States District Court
Middle District of Georgia
Valdosta Division
Deposition Testimony
September 2018

In Re Inovalon Holdings, Inc. Securities Litigation
Case No. 1:16-cv-04923-VM
United States District Court
Southern District of New York
Deposition Testimony
December 2018

In Re First Solar, Inc. Securities Litigation
Case No. 2:12-cv-00555-DGC
United States District Court
District of Arizona
Deposition Testimony
January 2019

Exhibit-3

Steven P. Feinstein, Ph.D., CFA
Testimony provided since the Feinstein Report

In Re Puma Biotechnology, Inc. Securities Litigation
Case No. 8:15-cv-00865-AG-JLG
United States District Court
Central District of California
Deposition Testimony
April 2017
Deposition Testimony
June 2018
Trial Testimony
January 2019

In Re Seaworld Entertainment, Inc. Securities Litigation
Case No. 3:14-cv-02129-MMA-AGS
United States District Court
Southern District of California
Deposition Testimony
March 2019

In Re Southern Company Securities Litigation
Case No. 1:17-cv-00241-MHC
United States District Court
Northern District of Georgia
Atlanta Division
Deposition Testimony
December 2018
Testimony at Evidentiary Hearing
May 2019

Exhibit-4**Twitter Common Stock
Prices, Volume, and Returns**

28 July 2014 through 3 August 2015

Date	Twitter Closing Price	Twitter Closing Bid	Twitter Closing Ask	Twitter Trading Volume	Twitter Logarithmic Return
7/28/2014	\$37.93	\$37.93	\$37.94	16,781,679	
7/29/2014	\$38.59	\$38.60	\$38.61	65,338,012	1.73%
7/30/2014	\$46.30	\$46.28	\$46.30	116,195,894	18.21%
7/31/2014	\$45.19	\$45.17	\$45.18	47,170,214	-2.43%
8/1/2014	\$44.13	\$44.11	\$44.12	37,194,768	-2.37%
8/4/2014	\$43.47	\$43.45	\$43.46	22,424,950	-1.51%
8/5/2014	\$43.83	\$43.82	\$43.83	26,404,094	0.82%
8/6/2014	\$43.46	\$43.44	\$43.45	20,355,349	-0.85%
8/7/2014	\$43.00	\$42.99	\$43.00	25,389,111	-1.06%
8/8/2014	\$43.13	\$43.11	\$43.12	14,977,725	0.30%
8/11/2014	\$43.27	\$43.27	\$43.28	18,420,323	0.32%
8/12/2014	\$43.81	\$43.81	\$43.82	29,582,276	1.24%
8/13/2014	\$44.15	\$44.14	\$44.15	16,180,836	0.77%
8/14/2014	\$45.33	\$45.32	\$45.33	23,638,935	2.64%
8/15/2014	\$44.76	\$44.75	\$44.76	17,794,698	-1.27%
8/18/2014	\$45.12	\$45.11	\$45.12	14,835,442	0.80%
8/19/2014	\$45.09	\$45.07	\$45.08	11,903,442	-0.07%
8/20/2014	\$45.06	\$45.05	\$45.06	10,383,233	-0.07%
8/21/2014	\$45.11	\$45.10	\$45.11	10,619,316	0.11%
8/22/2014	\$45.98	\$46.00	\$46.01	19,429,784	1.91%
8/25/2014	\$46.10	\$46.09	\$46.10	17,583,487	0.26%
8/26/2014	\$48.17	\$48.19	\$48.20	27,716,184	4.39%
8/27/2014	\$48.06	\$48.05	\$48.06	26,127,632	-0.23%
8/28/2014	\$49.43	\$49.40	\$49.41	35,076,316	2.81%
8/29/2014	\$49.75	\$49.69	\$49.70	31,926,942	0.65%
9/2/2014	\$51.02	\$51.00	\$51.01	28,267,227	2.52%
9/3/2014	\$49.33	\$49.28	\$49.29	34,411,151	-3.37%
9/4/2014	\$50.24	\$50.21	\$50.22	24,413,060	1.83%
9/5/2014	\$50.70	\$50.67	\$50.68	20,251,354	0.91%
9/8/2014	\$52.00	\$51.98	\$51.99	30,836,421	2.53%
9/9/2014	\$50.61	\$50.61	\$50.62	25,034,416	-2.71%
9/10/2014	\$52.91	\$52.89	\$52.90	38,057,661	4.44%
9/11/2014	\$52.64	\$52.64	\$52.65	38,099,375	-0.51%
9/12/2014	\$52.11	\$52.07	\$52.08	22,986,464	-1.01%
9/15/2014	\$49.38	\$49.38	\$49.39	38,374,126	-5.38%

Exhibit-4**Twitter Common Stock
Prices, Volume, and Returns**

28 July 2014 through 3 August 2015

Date	Twitter Closing Price	Twitter Closing Bid	Twitter Closing Ask	Twitter Trading Volume	Twitter Logarithmic Return
9/16/2014	\$50.83	\$50.83	\$50.84	26,744,763	2.89%
9/17/2014	\$50.70	\$50.69	\$50.70	22,874,400	-0.26%
9/18/2014	\$50.88	\$50.89	\$50.90	22,484,799	0.35%
9/19/2014	\$53.00	\$52.58	\$52.59	38,192,577	4.08%
9/22/2014	\$51.94	\$51.94	\$51.95	21,744,393	-2.02%
9/23/2014	\$52.17	\$52.15	\$52.16	19,997,954	0.44%
9/24/2014	\$52.96	\$52.93	\$52.94	17,656,100	1.50%
9/25/2014	\$51.45	\$51.41	\$51.42	21,071,508	-2.89%
9/26/2014	\$51.89	\$51.87	\$51.88	14,125,293	0.85%
9/29/2014	\$51.74	\$51.72	\$51.73	15,404,256	-0.29%
9/30/2014	\$51.58	\$51.57	\$51.58	12,315,738	-0.31%
10/1/2014	\$50.06	\$50.03	\$50.04	24,733,453	-2.99%
10/2/2014	\$51.85	\$51.84	\$51.85	27,056,496	3.51%
10/3/2014	\$53.94	\$53.93	\$53.94	31,227,155	3.95%
10/6/2014	\$53.49	\$53.49	\$53.50	20,033,423	-0.84%
10/7/2014	\$53.53	\$53.48	\$53.49	26,082,251	0.07%
10/8/2014	\$55.42	\$55.40	\$55.41	31,098,532	3.47%
10/9/2014	\$55.29	\$55.28	\$55.29	29,741,359	-0.23%
10/10/2014	\$50.40	\$50.36	\$50.38	46,727,275	-9.26%
10/13/2014	\$48.49	\$48.48	\$48.49	35,326,778	-3.86%
10/14/2014	\$48.58	\$48.58	\$48.58	29,723,607	0.19%
10/15/2014	\$49.99	\$49.97	\$49.98	34,371,495	2.86%
10/16/2014	\$48.23	\$48.24	\$48.25	30,818,799	-3.58%
10/17/2014	\$48.77	\$48.76	\$48.77	24,630,575	1.11%
10/20/2014	\$50.70	\$50.67	\$50.68	17,781,053	3.88%
10/21/2014	\$50.63	\$50.63	\$50.64	21,351,031	-0.14%
10/22/2014	\$49.08	\$49.08	\$49.09	26,147,867	-3.11%
10/23/2014	\$49.67	\$49.66	\$49.67	23,099,811	1.19%
10/24/2014	\$49.95	\$49.91	\$49.92	12,035,228	0.56%
10/27/2014	\$48.56	\$48.55	\$48.56	51,896,310	-2.82%
10/28/2014	\$43.78	\$43.77	\$43.78	83,514,039	-10.36%
10/29/2014	\$42.08	\$42.07	\$42.08	40,261,918	-3.96%
10/30/2014	\$41.80	\$41.80	\$41.81	42,012,595	-0.67%
10/31/2014	\$41.47	\$41.44	\$41.45	23,895,091	-0.79%
11/3/2014	\$40.21	\$40.21	\$40.22	31,454,276	-3.09%

Exhibit-4**Twitter Common Stock
Prices, Volume, and Returns**

28 July 2014 through 3 August 2015

Date	Twitter Closing Price	Twitter Closing Bid	Twitter Closing Ask	Twitter Trading Volume	Twitter Logarithmic Return
11/4/2014	\$40.90	\$40.88	\$40.90	19,544,339	1.70%
11/5/2014	\$40.37	\$40.37	\$40.38	19,742,219	-1.30%
11/6/2014	\$40.84	\$40.84	\$40.85	16,292,122	1.16%
11/7/2014	\$40.31	\$40.29	\$40.30	18,558,908	-1.31%
11/10/2014	\$39.59	\$39.56	\$39.57	19,069,311	-1.80%
11/11/2014	\$39.59	\$39.59	\$39.60	19,199,463	0.00%
11/12/2014	\$42.54	\$42.54	\$42.55	51,814,076	7.19%
11/13/2014	\$40.04	\$40.05	\$40.06	67,287,397	-6.06%
11/14/2014	\$41.85	\$41.81	\$41.82	33,059,767	4.42%
11/17/2014	\$40.47	\$40.48	\$40.49	20,665,239	-3.35%
11/18/2014	\$40.61	\$40.60	\$40.61	18,605,048	0.35%
11/19/2014	\$39.71	\$39.70	\$39.71	19,050,142	-2.24%
11/20/2014	\$39.81	\$39.79	\$39.80	13,717,120	0.25%
11/21/2014	\$40.03	\$40.01	\$40.02	12,066,551	0.55%
11/24/2014	\$40.19	\$40.19	\$40.20	15,176,007	0.40%
11/25/2014	\$39.76	\$39.73	\$39.74	16,165,082	-1.08%
11/26/2014	\$41.13	\$41.13	\$41.14	23,794,731	3.39%
11/28/2014	\$41.74	\$41.73	\$41.74	11,113,905	1.47%
12/1/2014	\$39.04	\$39.03	\$39.04	22,213,988	-6.69%
12/2/2014	\$38.91	\$38.92	\$38.92	16,430,289	-0.33%
12/3/2014	\$39.06	\$39.05	\$39.06	13,241,278	0.38%
12/4/2014	\$38.79	\$38.79	\$38.80	13,034,027	-0.69%
12/5/2014	\$38.49	\$38.46	\$38.47	12,587,725	-0.78%
12/8/2014	\$36.29	\$36.28	\$36.29	30,112,791	-5.89%
12/9/2014	\$37.05	\$37.03	\$37.05	20,542,824	2.07%
12/10/2014	\$36.35	\$36.35	\$36.36	16,497,652	-1.91%
12/11/2014	\$36.70	\$36.69	\$36.70	15,707,079	0.96%
12/12/2014	\$37.10	\$37.09	\$37.10	15,222,465	1.08%
12/15/2014	\$36.85	\$36.84	\$36.85	16,832,975	-0.68%
12/16/2014	\$35.13	\$35.12	\$35.13	19,241,183	-4.78%
12/17/2014	\$35.57	\$35.56	\$35.57	18,544,835	1.24%
12/18/2014	\$36.73	\$36.72	\$36.73	19,087,488	3.21%
12/19/2014	\$37.08	\$37.06	\$37.07	16,068,717	0.95%
12/22/2014	\$38.43	\$38.43	\$38.44	20,078,978	3.58%
12/23/2014	\$37.57	\$37.56	\$37.57	16,858,037	-2.26%

Exhibit-4**Twitter Common Stock
Prices, Volume, and Returns**

28 July 2014 through 3 August 2015

Date	Twitter Closing Price	Twitter Closing Bid	Twitter Closing Ask	Twitter Trading Volume	Twitter Logarithmic Return
12/24/2014	\$37.61	\$37.61	\$37.62	6,263,320	0.11%
12/26/2014	\$37.60	\$37.59	\$37.60	7,323,988	-0.03%
12/29/2014	\$36.42	\$36.40	\$36.41	13,565,360	-3.19%
12/30/2014	\$35.86	\$35.84	\$35.85	19,494,563	-1.55%
12/31/2014	\$35.87	\$35.86	\$35.87	17,650,083	0.03%
1/2/2015	\$36.56	\$36.55	\$36.56	12,062,461	1.91%
1/5/2015	\$36.38	\$36.37	\$36.38	15,062,744	-0.49%
1/6/2015	\$38.76	\$38.75	\$38.76	33,050,812	6.34%
1/7/2015	\$37.28	\$37.26	\$37.28	22,675,663	-3.89%
1/8/2015	\$39.09	\$39.11	\$39.13	19,190,436	4.74%
1/9/2015	\$40.17	\$40.19	\$40.20	24,738,362	2.73%
1/12/2015	\$39.37	\$39.35	\$39.36	27,639,025	-2.01%
1/13/2015	\$39.65	\$39.64	\$39.65	18,395,519	0.71%
1/14/2015	\$39.85	\$39.84	\$39.85	16,054,746	0.50%
1/15/2015	\$36.93	\$36.91	\$36.92	23,042,008	-7.61%
1/16/2015	\$37.31	\$37.28	\$37.29	14,966,077	1.02%
1/20/2015	\$37.57	\$37.55	\$37.56	17,641,670	0.69%
1/21/2015	\$37.83	\$37.81	\$37.82	12,181,324	0.69%
1/22/2015	\$39.07	\$39.07	\$39.08	20,451,716	3.23%
1/23/2015	\$39.42	\$39.42	\$39.43	16,439,238	0.89%
1/26/2015	\$40.10	\$40.09	\$40.10	13,838,215	1.71%
1/27/2015	\$38.92	\$38.90	\$38.91	15,746,411	-2.99%
1/28/2015	\$37.15	\$37.13	\$37.14	22,367,616	-4.65%
1/29/2015	\$36.68	\$36.67	\$36.68	20,088,464	-1.27%
1/30/2015	\$37.53	\$37.54	\$37.55	15,390,172	2.29%
2/2/2015	\$37.46	\$37.44	\$37.45	13,895,869	-0.19%
2/3/2015	\$39.79	\$39.79	\$39.80	28,395,371	6.03%
2/4/2015	\$40.72	\$40.70	\$40.72	23,116,779	2.31%
2/5/2015	\$41.26	\$41.29	\$41.30	61,997,292	1.32%
2/6/2015	\$48.01	\$48.03	\$48.04	102,973,023	15.15%
2/9/2015	\$47.32	\$47.30	\$47.31	36,177,946	-1.45%
2/10/2015	\$46.26	\$46.24	\$46.25	32,287,813	-2.27%
2/11/2015	\$47.50	\$47.50	\$47.51	24,747,029	2.65%
2/12/2015	\$47.95	\$47.95	\$47.96	23,071,572	0.94%
2/13/2015	\$48.50	\$48.51	\$48.53	20,809,627	1.14%

Exhibit-4**Twitter Common Stock
Prices, Volume, and Returns**

28 July 2014 through 3 August 2015

Date	Twitter Closing Price	Twitter Closing Bid	Twitter Closing Ask	Twitter Trading Volume	Twitter Logarithmic Return
2/17/2015	\$48.03	\$48.03	\$48.04	16,670,155	-0.97%
2/18/2015	\$47.82	\$47.78	\$47.79	15,503,060	-0.44%
2/19/2015	\$48.70	\$48.70	\$48.71	18,153,446	1.82%
2/20/2015	\$49.11	\$49.09	\$49.10	20,755,575	0.84%
2/23/2015	\$48.47	\$48.45	\$48.46	12,541,405	-1.31%
2/24/2015	\$48.69	\$48.66	\$48.67	11,073,664	0.45%
2/25/2015	\$48.55	\$48.54	\$48.55	11,663,183	-0.29%
2/26/2015	\$49.41	\$49.42	\$49.43	22,340,876	1.76%
2/27/2015	\$48.08	\$48.08	\$48.09	15,004,478	-2.73%
3/2/2015	\$48.15	\$48.14	\$48.15	13,430,911	0.15%
3/3/2015	\$47.71	\$47.68	\$47.69	16,754,427	-0.92%
3/4/2015	\$47.57	\$47.56	\$47.57	14,290,082	-0.29%
3/5/2015	\$47.35	\$47.35	\$47.36	13,511,889	-0.46%
3/6/2015	\$46.75	\$46.74	\$46.75	11,534,904	-1.28%
3/9/2015	\$47.59	\$47.58	\$47.59	13,635,901	1.78%
3/10/2015	\$45.84	\$45.84	\$45.85	17,289,874	-3.75%
3/11/2015	\$46.27	\$46.28	\$46.29	12,273,750	0.93%
3/12/2015	\$47.07	\$47.05	\$47.06	12,204,772	1.71%
3/13/2015	\$46.66	\$46.63	\$46.64	13,368,059	-0.87%
3/16/2015	\$46.43	\$46.42	\$46.43	10,243,160	-0.49%
3/17/2015	\$46.93	\$46.92	\$46.93	13,361,311	1.07%
3/18/2015	\$47.20	\$47.21	\$47.22	13,115,352	0.57%
3/19/2015	\$47.93	\$47.93	\$47.94	15,957,089	1.53%
3/20/2015	\$48.44	\$48.45	\$48.46	18,676,496	1.06%
3/23/2015	\$48.46	\$48.47	\$48.48	16,389,818	0.04%
3/24/2015	\$51.47	\$51.47	\$51.48	38,181,773	6.03%
3/25/2015	\$49.50	\$49.49	\$49.50	31,694,649	-3.90%
3/26/2015	\$49.92	\$49.92	\$49.93	24,385,783	0.84%
3/27/2015	\$50.01	\$50.00	\$50.01	14,852,364	0.18%
3/30/2015	\$49.89	\$49.87	\$49.88	20,365,393	-0.24%
3/31/2015	\$50.08	\$50.08	\$50.09	23,898,381	0.38%
4/1/2015	\$50.47	\$50.47	\$50.48	24,299,197	0.78%
4/2/2015	\$50.42	\$50.40	\$50.41	13,423,909	-0.10%
4/6/2015	\$50.84	\$50.81	\$50.82	14,539,680	0.83%
4/7/2015	\$52.87	\$52.86	\$52.87	37,080,755	3.92%

Exhibit-4**Twitter Common Stock
Prices, Volume, and Returns**

28 July 2014 through 3 August 2015

Date	Twitter Closing Price	Twitter Closing Bid	Twitter Closing Ask	Twitter Trading Volume	Twitter Logarithmic Return
4/8/2015	\$52.30	\$52.28	\$52.29	22,368,922	-1.08%
4/9/2015	\$52.17	\$52.17	\$52.18	17,877,667	-0.25%
4/10/2015	\$51.94	\$51.93	\$51.94	13,271,155	-0.44%
4/13/2015	\$51.62	\$51.60	\$51.61	12,306,515	-0.62%
4/14/2015	\$51.20	\$51.19	\$51.20	12,231,640	-0.82%
4/15/2015	\$51.30	\$51.29	\$51.30	13,192,067	0.20%
4/16/2015	\$52.03	\$52.04	\$52.05	14,313,301	1.41%
4/17/2015	\$50.66	\$50.65	\$50.66	16,676,896	-2.67%
4/20/2015	\$51.40	\$51.38	\$51.39	11,004,476	1.45%
4/21/2015	\$51.32	\$51.33	\$51.34	8,461,283	-0.16%
4/22/2015	\$51.73	\$51.71	\$51.72	11,479,493	0.80%
4/23/2015	\$51.41	\$51.40	\$51.41	11,490,400	-0.62%
4/24/2015	\$50.82	\$50.82	\$50.85	14,896,860	-1.15%
4/27/2015	\$51.66	\$51.65	\$51.66	23,991,902	1.64%
4/28/2015	\$42.27	\$42.26	\$42.27	77,336,612	-20.06%
4/29/2015	\$38.49	\$38.48	\$38.49	120,488,557	-9.37%
4/30/2015	\$38.96	\$38.96	\$38.97	46,651,477	1.21%
5/1/2015	\$37.84	\$37.83	\$37.84	37,785,543	-2.92%
5/4/2015	\$37.88	\$37.87	\$37.88	27,622,537	0.11%
5/5/2015	\$37.42	\$37.41	\$37.42	22,605,023	-1.22%
5/6/2015	\$37.26	\$37.25	\$37.26	29,107,858	-0.43%
5/7/2015	\$37.71	\$37.70	\$37.71	21,258,764	1.20%
5/8/2015	\$37.59	\$37.59	\$37.60	14,395,832	-0.32%
5/11/2015	\$37.31	\$37.30	\$37.31	12,329,491	-0.75%
5/12/2015	\$37.48	\$37.47	\$37.48	11,792,938	0.45%
5/13/2015	\$37.72	\$37.71	\$37.72	14,075,331	0.64%
5/14/2015	\$37.33	\$37.31	\$37.32	14,259,607	-1.04%
5/15/2015	\$37.10	\$37.10	\$37.11	16,799,060	-0.62%
5/18/2015	\$37.28	\$37.27	\$37.28	11,237,346	0.48%
5/19/2015	\$37.50	\$37.49	\$37.50	26,941,996	0.59%
5/20/2015	\$36.78	\$36.79	\$36.80	23,404,469	-1.94%
5/21/2015	\$36.68	\$36.68	\$36.69	17,447,682	-0.27%
5/22/2015	\$36.60	\$36.59	\$36.60	9,861,815	-0.22%
5/26/2015	\$36.51	\$36.50	\$36.51	13,068,502	-0.25%
5/27/2015	\$36.41	\$36.41	\$36.42	14,463,568	-0.27%

Exhibit-4**Twitter Common Stock
Prices, Volume, and Returns**

28 July 2014 through 3 August 2015

Date	Twitter Closing Price	Twitter Closing Bid	Twitter Closing Ask	Twitter Trading Volume	Twitter Logarithmic Return
5/28/2015	\$36.83	\$36.82	\$36.83	17,912,105	1.15%
5/29/2015	\$36.67	\$36.66	\$36.67	16,849,058	-0.44%
6/1/2015	\$36.63	\$36.61	\$36.62	10,008,279	-0.11%
6/2/2015	\$36.40	\$36.39	\$36.40	13,128,349	-0.63%
6/3/2015	\$37.00	\$37.00	\$37.02	14,023,524	1.63%
6/4/2015	\$36.71	\$36.71	\$36.72	23,762,920	-0.79%
6/5/2015	\$37.00	\$36.99	\$37.00	11,854,282	0.79%
6/8/2015	\$36.46	\$36.45	\$36.46	11,767,083	-1.47%
6/9/2015	\$35.88	\$35.88	\$35.89	14,034,468	-1.60%
6/10/2015	\$35.85	\$35.84	\$35.85	12,634,817	-0.08%
6/11/2015	\$35.84	\$35.82	\$35.83	20,546,962	-0.03%
6/12/2015	\$35.90	\$35.88	\$35.89	60,914,449	0.17%
6/15/2015	\$34.67	\$34.65	\$34.66	32,932,110	-3.49%
6/16/2015	\$34.82	\$34.81	\$34.82	49,856,071	0.43%
6/17/2015	\$34.69	\$34.68	\$34.69	27,278,532	-0.37%
6/18/2015	\$34.66	\$34.65	\$34.66	19,447,110	-0.09%
6/19/2015	\$35.86	\$35.87	\$35.88	33,674,913	3.40%
6/22/2015	\$35.55	\$35.56	\$35.57	21,456,373	-0.87%
6/23/2015	\$35.37	\$35.36	\$35.37	25,891,418	-0.51%
6/24/2015	\$35.17	\$35.17	\$35.18	13,020,956	-0.57%
6/25/2015	\$35.17	\$35.16	\$35.17	10,756,756	0.00%
6/26/2015	\$35.26	\$35.25	\$35.26	17,387,971	0.26%
6/29/2015	\$34.21	\$34.21	\$34.22	25,220,715	-3.02%
6/30/2015	\$36.22	\$36.23	\$36.24	26,095,592	5.71%
7/1/2015	\$35.40	\$35.41	\$35.42	23,674,620	-2.29%
7/2/2015	\$35.72	\$35.70	\$35.71	17,663,959	0.90%
7/6/2015	\$35.43	\$35.41	\$35.42	11,325,391	-0.82%
7/7/2015	\$35.52	\$35.52	\$35.53	14,203,167	0.25%
7/8/2015	\$34.76	\$34.72	\$34.73	15,522,331	-2.16%
7/9/2015	\$34.36	\$34.35	\$34.36	14,099,347	-1.16%
7/10/2015	\$34.91	\$34.92	\$34.93	10,639,720	1.59%
7/13/2015	\$35.78	\$35.79	\$35.80	17,118,202	2.46%
7/14/2015	\$36.72	\$36.70	\$36.71	50,102,513	2.59%
7/15/2015	\$35.66	\$35.66	\$35.67	18,296,837	-2.93%
7/16/2015	\$36.10	\$36.09	\$36.10	11,367,681	1.23%

Exhibit-4**Twitter Common Stock
Prices, Volume, and Returns**

28 July 2014 through 3 August 2015

Date	Twitter Closing Price	Twitter Closing Bid	Twitter Closing Ask	Twitter Trading Volume	Twitter Logarithmic Return
7/17/2015	\$35.67	\$35.65	\$35.66	12,838,454	-1.20%
7/20/2015	\$35.81	\$35.80	\$35.81	9,889,748	0.39%
7/21/2015	\$36.63	\$36.61	\$36.62	12,536,207	2.26%
7/22/2015	\$36.09	\$36.07	\$36.08	11,772,251	-1.49%
7/23/2015	\$36.19	\$36.19	\$36.20	10,407,769	0.28%
7/24/2015	\$35.42	\$35.40	\$35.41	13,000,824	-2.15%
7/27/2015	\$34.70	\$34.72	\$34.73	24,629,131	-2.05%
7/28/2015	\$36.54	\$36.55	\$36.56	57,688,647	5.17%
7/29/2015	\$31.24	\$31.23	\$31.24	92,939,850	-15.67%
7/30/2015	\$31.47	\$31.48	\$31.49	29,438,817	0.73%
7/31/2015	\$31.01	\$31.00	\$31.01	18,150,252	-1.47%
8/3/2015	\$29.27	\$29.25	\$29.26	46,637,134	-5.77%

Source: CRSP.

Exhibit-5**Market and Sector Index Returns**

29 July 2014 through 3 August 2015

Date	Market Index Return	Sector Index Return
7/29/2014	-0.37%	0.06%
7/30/2014	0.05%	1.35%
7/31/2014	-1.95%	-2.36%
8/1/2014	-0.35%	-0.27%
8/4/2014	0.71%	1.67%
8/5/2014	-0.89%	-0.84%
8/6/2014	0.03%	0.03%
8/7/2014	-0.49%	-0.08%
8/8/2014	1.02%	0.57%
8/11/2014	0.48%	0.94%
8/12/2014	-0.22%	-0.54%
8/13/2014	0.66%	1.10%
8/14/2014	0.42%	0.42%
8/15/2014	0.03%	-0.10%
8/18/2014	0.85%	1.08%
8/19/2014	0.47%	0.38%
8/20/2014	0.20%	-0.14%
8/21/2014	0.25%	0.35%
8/22/2014	-0.14%	0.63%
8/25/2014	0.45%	-0.03%
8/26/2014	0.22%	0.68%
8/27/2014	0.06%	-0.65%
8/28/2014	-0.18%	-0.63%
8/29/2014	0.38%	0.59%
9/2/2014	0.00%	0.88%
9/3/2014	-0.06%	-0.54%
9/4/2014	-0.24%	0.20%
9/5/2014	0.44%	0.32%
9/8/2014	-0.28%	0.82%
9/9/2014	-0.63%	-1.79%
9/10/2014	0.33%	0.71%
9/11/2014	0.13%	0.13%
9/12/2014	-0.66%	0.19%
9/15/2014	-0.29%	-2.22%
9/16/2014	0.70%	0.59%
9/17/2014	0.08%	-0.43%

Exhibit-5**Market and Sector Index Returns**

29 July 2014 through 3 August 2015

Date	Market Index Return	Sector Index Return
9/18/2014	0.45%	0.61%
9/19/2014	-0.24%	-0.03%
9/22/2014	-1.01%	-1.90%
9/23/2014	-0.60%	-0.29%
9/24/2014	0.71%	1.14%
9/25/2014	-1.57%	-1.99%
9/26/2014	0.84%	1.18%
9/29/2014	-0.24%	0.10%
9/30/2014	-0.41%	0.36%
10/1/2014	-1.30%	-1.84%
10/2/2014	0.08%	0.49%
10/3/2014	0.91%	1.30%
10/6/2014	-0.16%	-0.49%
10/7/2014	-1.51%	-1.85%
10/8/2014	1.58%	1.57%
10/9/2014	-2.14%	-2.11%
10/10/2014	-1.34%	-3.12%
10/13/2014	-1.56%	-1.82%
10/14/2014	0.23%	0.61%
10/15/2014	-0.45%	0.15%
10/16/2014	0.38%	-1.07%
10/17/2014	1.07%	0.73%
10/20/2014	0.92%	1.18%
10/21/2014	1.90%	2.36%
10/22/2014	-0.89%	-0.90%
10/23/2014	1.22%	1.72%
10/24/2014	0.60%	0.06%
10/27/2014	-0.22%	0.01%
10/28/2014	1.36%	2.02%
10/29/2014	-0.22%	-1.18%
10/30/2014	0.50%	0.71%
10/31/2014	1.15%	2.64%
11/3/2014	-0.07%	0.19%
11/4/2014	-0.46%	-0.21%
11/5/2014	0.49%	-1.37%
11/6/2014	0.38%	0.26%

Exhibit-5**Market and Sector Index Returns**

29 July 2014 through 3 August 2015

Date	Market Index Return	Sector Index Return
11/7/2014	0.20%	0.19%
11/10/2014	0.27%	0.90%
11/11/2014	0.11%	0.57%
11/12/2014	0.06%	0.28%
11/13/2014	-0.09%	-0.28%
11/14/2014	0.13%	1.32%
11/17/2014	-0.02%	-0.99%
11/18/2014	0.55%	0.09%
11/19/2014	-0.24%	-0.95%
11/20/2014	0.33%	0.20%
11/21/2014	0.53%	0.09%
11/24/2014	0.32%	0.58%
11/25/2014	-0.04%	0.38%
11/26/2014	0.28%	0.38%
11/28/2014	-0.61%	0.15%
12/1/2014	-0.90%	-1.93%
12/2/2014	0.59%	0.56%
12/3/2014	0.52%	-0.04%
12/4/2014	-0.21%	0.38%
12/5/2014	0.15%	0.08%
12/8/2014	-0.95%	-1.59%
12/9/2014	0.17%	0.87%
12/10/2014	-1.76%	-1.81%
12/11/2014	0.41%	0.73%
12/12/2014	-1.53%	-0.87%
12/15/2014	-0.77%	-0.91%
12/16/2014	-0.59%	-1.81%
12/17/2014	2.15%	2.64%
12/18/2014	2.13%	2.16%
12/19/2014	0.46%	0.96%
12/22/2014	0.33%	0.99%
12/23/2014	0.22%	-0.08%
12/24/2014	0.06%	-0.02%
12/26/2014	0.37%	0.53%
12/29/2014	0.12%	-0.53%
12/30/2014	-0.43%	-0.50%

Exhibit-5**Market and Sector Index Returns**

29 July 2014 through 3 August 2015

Date	Market Index Return	Sector Index Return
12/31/2014	-0.88%	-0.71%
1/2/2015	-0.02%	-0.12%
1/5/2015	-1.84%	-2.07%
1/6/2015	-0.97%	-1.55%
1/7/2015	1.11%	0.36%
1/8/2015	1.67%	1.86%
1/9/2015	-0.76%	-0.95%
1/12/2015	-0.78%	-1.19%
1/13/2015	-0.23%	0.16%
1/14/2015	-0.52%	-0.82%
1/15/2015	-0.92%	-2.24%
1/16/2015	1.37%	1.48%
1/20/2015	0.03%	0.41%
1/21/2015	0.45%	1.52%
1/22/2015	1.46%	2.29%
1/23/2015	-0.42%	0.82%
1/26/2015	0.44%	-0.01%
1/27/2015	-1.01%	-1.75%
1/28/2015	-1.42%	-1.32%
1/29/2015	0.84%	0.68%
1/30/2015	-1.22%	0.25%
2/2/2015	1.22%	0.51%
2/3/2015	1.49%	1.72%
2/4/2015	-0.44%	-0.42%
2/5/2015	1.14%	0.90%
2/6/2015	-0.36%	-0.40%
2/9/2015	-0.41%	-0.48%
2/10/2015	0.86%	1.21%
2/11/2015	-0.04%	0.18%
2/12/2015	1.04%	1.78%
2/13/2015	0.47%	1.50%
2/17/2015	0.17%	-0.19%
2/18/2015	0.02%	0.38%
2/19/2015	-0.10%	1.56%
2/20/2015	0.57%	0.59%
2/23/2015	-0.06%	-0.92%

Exhibit-5**Market and Sector Index Returns**

29 July 2014 through 3 August 2015

Date	Market Index Return	Sector Index Return
2/24/2015	0.23%	0.01%
2/25/2015	0.07%	1.12%
2/26/2015	-0.15%	0.90%
2/27/2015	-0.26%	-0.91%
3/2/2015	0.55%	1.04%
3/3/2015	-0.41%	-0.71%
3/4/2015	-0.38%	-0.45%
3/5/2015	0.16%	0.65%
3/6/2015	-1.39%	-1.01%
3/9/2015	0.29%	-0.02%
3/10/2015	-1.56%	-1.97%
3/11/2015	-0.02%	-0.00%
3/12/2015	1.19%	1.25%
3/13/2015	-0.55%	-0.80%
3/16/2015	1.17%	0.56%
3/17/2015	-0.17%	0.24%
3/18/2015	1.20%	0.98%
3/19/2015	-0.46%	0.10%
3/20/2015	0.93%	0.20%
3/23/2015	-0.10%	0.07%
3/24/2015	-0.46%	-0.02%
3/25/2015	-1.48%	-2.11%
3/26/2015	-0.22%	-0.31%
3/27/2015	0.25%	0.37%
3/30/2015	1.15%	0.56%
3/31/2015	-0.71%	-0.67%
4/1/2015	-0.27%	-0.76%
4/2/2015	0.40%	0.26%
4/6/2015	0.65%	0.67%
4/7/2015	-0.21%	0.04%
4/8/2015	0.36%	1.20%
4/9/2015	0.34%	0.17%
4/10/2015	0.46%	0.43%
4/13/2015	-0.37%	0.01%
4/14/2015	0.19%	-0.10%
4/15/2015	0.62%	0.17%

Exhibit-5**Market and Sector Index Returns**

29 July 2014 through 3 August 2015

Date	Market Index Return	Sector Index Return
4/16/2015	-0.04%	1.14%
4/17/2015	-1.14%	-1.95%
4/20/2015	0.80%	1.40%
4/21/2015	-0.10%	0.16%
4/22/2015	0.41%	0.73%
4/23/2015	0.35%	0.25%
4/24/2015	0.12%	1.63%
4/27/2015	-0.48%	-0.22%
4/28/2015	0.25%	-0.46%
4/29/2015	-0.39%	0.25%
4/30/2015	-1.08%	-1.59%
5/1/2015	0.92%	0.21%
5/4/2015	0.30%	0.10%
5/5/2015	-1.16%	-0.74%
5/6/2015	-0.34%	-0.08%
5/7/2015	0.34%	0.82%
5/8/2015	1.20%	0.78%
5/11/2015	-0.40%	-0.24%
5/12/2015	-0.22%	-0.61%
5/13/2015	0.02%	0.05%
5/14/2015	0.97%	1.47%
5/15/2015	0.11%	-0.38%
5/18/2015	0.33%	0.58%
5/19/2015	-0.14%	-0.70%
5/20/2015	-0.03%	0.18%
5/21/2015	0.25%	0.78%
5/22/2015	-0.22%	0.12%
5/26/2015	-1.05%	-1.04%
5/27/2015	0.86%	1.10%
5/28/2015	-0.12%	-0.41%
5/29/2015	-0.58%	-0.84%
6/1/2015	0.15%	0.33%
6/2/2015	0.04%	0.32%
6/3/2015	0.26%	0.84%
6/4/2015	-0.89%	-0.85%
6/5/2015	-0.00%	0.40%

Exhibit-5**Market and Sector Index Returns**

29 July 2014 through 3 August 2015

Date	Market Index Return	Sector Index Return
6/8/2015	-0.66%	-1.40%
6/9/2015	-0.00%	-0.05%
6/10/2015	1.15%	1.43%
6/11/2015	0.19%	-0.25%
6/12/2015	-0.62%	-0.54%
6/15/2015	-0.41%	0.07%
6/16/2015	0.49%	0.63%
6/17/2015	0.17%	0.34%
6/18/2015	0.92%	1.24%
6/19/2015	-0.49%	-0.56%
6/22/2015	0.58%	0.71%
6/23/2015	0.13%	0.70%
6/24/2015	-0.74%	-0.69%
6/25/2015	-0.27%	0.01%
6/26/2015	-0.08%	-0.64%
6/29/2015	-2.17%	-2.67%
6/30/2015	0.30%	0.87%
7/1/2015	0.55%	0.46%
7/2/2015	-0.06%	0.08%
7/6/2015	-0.45%	-0.51%
7/7/2015	0.50%	0.10%
7/8/2015	-1.66%	-1.67%
7/9/2015	0.27%	0.82%
7/10/2015	1.26%	1.47%
7/13/2015	1.02%	2.04%
7/14/2015	0.47%	0.71%
7/15/2015	-0.25%	-0.59%
7/16/2015	0.69%	2.41%
7/17/2015	-0.06%	2.85%
7/20/2015	-0.12%	0.59%
7/21/2015	-0.41%	-0.02%
7/22/2015	-0.24%	-0.53%
7/23/2015	-0.55%	-1.05%
7/24/2015	-1.01%	0.41%
7/27/2015	-0.71%	-1.23%
7/28/2015	1.22%	0.85%

Exhibit-5

Market and Sector Index Returns

29 July 2014 through 3 August 2015

Date	Market Index Return	Sector Index Return
7/29/2015	0.75%	0.55%
7/30/2015	0.08%	0.47%
7/31/2015	-0.08%	-0.06%
8/3/2015	-0.37%	-0.28%

Sources: Bloomberg and CRSP.

Exhibit-6**Twitter Common Stock Regression Results**

Estimation Period: 29 July 2014 through 28 July 2015

Regression Statistics			
R Squared		0.613	
Adjusted R Squared		0.602	
Standard Error		1.98%	
Observations		252	

	Coefficients	Standard Error	<i>t</i>-statistic
Intercept	-0.09%	0.13%	-0.69
Market Index	-0.477	0.287	-1.66
Sector Index	1.424	0.210	6.79
30 July 2014	16.40%	2.00%	8.20
28 October 2014	-12.50%	2.00%	-6.26
6 February 2015	15.63%	1.98%	7.88
28 April 2015	-19.19%	1.99%	-9.65
29 April 2015	-9.83%	1.99%	-4.94

Exhibit-7
Twitter Event Study Results

Date	Twitter Closing Price	Twitter Prior Day Closing Price	Twitter Logarithmic Return	Market Index Logarithmic Return	Sector Index Logarithmic Return	Twitter Explained Return	Twitter Residual Return	Twitter Residual \$ Return	<i>t</i> -statistic ^[1]	
28 April 2015	\$42.27	\$51.66	-20.06%	0.25%	-0.46%	-0.87%	-19.19%	-\$9.02	-9.70	*
29 April 2015	\$38.49	\$42.27	-9.37%	-0.39%	0.25%	0.46%	-9.83%	-\$3.96	-4.97	*
29 July 2015	\$31.24	\$36.54	-15.67%	0.75%	0.55%	0.33%	-16.00%	-\$5.40	-8.09	*
30 July 2015	\$31.47	\$31.24	0.73%	0.08%	0.47%	0.55%	0.19%	\$0.06	0.09	
31 July 2015	\$31.01	\$31.47	-1.47%	-0.08%	-0.06%	-0.14%	-1.33%	-\$0.42	-0.67	
3 August 2015	\$29.27	\$31.01	-5.77%	-0.37%	-0.28%	-0.30%	-5.47%	-\$1.65	-2.77	*
<i>29 July 2015 - 3 August 2015</i>			<i>-22.18%</i>	<i>0.39%</i>	<i>0.68%</i>	<i>0.44%</i>	<i>-22.62%</i>	<i>-\$7.41</i>	<i>-5.72</i> ^[2]	<i>*</i>

Notes:

[1] The threshold for significance using a two-tailed test is a *t*-statistic of greater (less) than positive (negative) 1.97. Statistically significant returns are marked with "**"

[2] The cumulative *t*-statistic is calculated as the sum of the *t*-statistic divided by the square root of the number of observations [$-11.43/\sqrt{4}$].

Exhibit-8**Artificial Inflation Ribbon**

6 February 2015 through 3 August 2015

Date	Inflation
2/6/2015	\$20.34
2/9/2015	\$20.34
2/10/2015	\$20.34
2/11/2015	\$20.34
2/12/2015	\$20.34
2/13/2015	\$20.34
2/17/2015	\$20.34
2/18/2015	\$20.34
2/19/2015	\$20.34
2/20/2015	\$20.34
2/23/2015	\$20.34
2/24/2015	\$20.34
2/25/2015	\$20.34
2/26/2015	\$20.34
2/27/2015	\$20.34
3/2/2015	\$20.34
3/3/2015	\$20.34
3/4/2015	\$20.34
3/5/2015	\$20.34
3/6/2015	\$20.34
3/9/2015	\$20.34
3/10/2015	\$20.34
3/11/2015	\$20.34
3/12/2015	\$20.34
3/13/2015	\$20.34
3/16/2015	\$20.34
3/17/2015	\$20.34
3/18/2015	\$20.34
3/19/2015	\$20.34
3/20/2015	\$20.34
3/23/2015	\$20.34
3/24/2015	\$20.34
3/25/2015	\$20.34
3/26/2015	\$20.34
3/27/2015	\$20.34
3/30/2015	\$20.34
3/31/2015	\$20.34
4/1/2015	\$20.34

Exhibit-8**Artificial Inflation Ribbon**

6 February 2015 through 3 August 2015

Date	Inflation
4/2/2015	\$20.34
4/6/2015	\$20.34
4/7/2015	\$20.34
4/8/2015	\$20.34
4/9/2015	\$20.34
4/10/2015	\$20.34
4/13/2015	\$20.34
4/14/2015	\$20.34
4/15/2015	\$20.34
4/16/2015	\$20.34
4/17/2015	\$20.34
4/20/2015	\$20.34
4/21/2015	\$20.34
4/22/2015	\$20.34
4/23/2015	\$20.34
4/24/2015	\$20.34
4/27/2015	\$20.34
4/28/2015	\$11.36
4/29/2015	\$7.41
4/30/2015	\$7.41
5/1/2015	\$7.41
5/4/2015	\$7.41
5/5/2015	\$7.41
5/6/2015	\$7.41
5/7/2015	\$7.41
5/8/2015	\$7.41
5/11/2015	\$7.41
5/12/2015	\$7.41
5/13/2015	\$7.41
5/14/2015	\$7.41
5/15/2015	\$7.41
5/18/2015	\$7.41
5/19/2015	\$7.41
5/20/2015	\$7.41
5/21/2015	\$7.41
5/22/2015	\$7.41
5/26/2015	\$7.41
5/27/2015	\$7.41

Exhibit-8**Artificial Inflation Ribbon**

6 February 2015 through 3 August 2015

Date	Inflation
5/28/2015	\$7.41
5/29/2015	\$7.41
6/1/2015	\$7.41
6/2/2015	\$7.41
6/3/2015	\$7.41
6/4/2015	\$7.41
6/5/2015	\$7.41
6/8/2015	\$7.41
6/9/2015	\$7.41
6/10/2015	\$7.41
6/11/2015	\$7.41
6/12/2015	\$7.41
6/15/2015	\$7.41
6/16/2015	\$7.41
6/17/2015	\$7.41
6/18/2015	\$7.41
6/19/2015	\$7.41
6/22/2015	\$7.41
6/23/2015	\$7.41
6/24/2015	\$7.41
6/25/2015	\$7.41
6/26/2015	\$7.41
6/29/2015	\$7.41
6/30/2015	\$7.41
7/1/2015	\$7.41
7/2/2015	\$7.41
7/6/2015	\$7.41
7/7/2015	\$7.41
7/8/2015	\$7.41
7/9/2015	\$7.41
7/10/2015	\$7.41
7/13/2015	\$7.41
7/14/2015	\$7.41
7/15/2015	\$7.41
7/16/2015	\$7.41
7/17/2015	\$7.41
7/20/2015	\$7.41
7/21/2015	\$7.41

Exhibit-8**Artificial Inflation Ribbon**

6 February 2015 through 3 August 2015

Date	Inflation
7/22/2015	\$7.41
7/23/2015	\$7.41
7/24/2015	\$7.41
7/27/2015	\$7.41
7/28/2015	\$7.41
7/29/2015	\$2.07
7/30/2015	\$2.07
7/31/2015	\$1.65
8/3/2015	\$0.00

Exhibit-9**Alternative Artificial Inflation
Ribbon**

6 February 2015 through 29 July 2015

Date	Inflation
2/6/2015	\$18.33
2/9/2015	\$18.33
2/10/2015	\$18.33
2/11/2015	\$18.33
2/12/2015	\$18.33
2/13/2015	\$18.33
2/17/2015	\$18.33
2/18/2015	\$18.33
2/19/2015	\$18.33
2/20/2015	\$18.33
2/23/2015	\$18.33
2/24/2015	\$18.33
2/25/2015	\$18.33
2/26/2015	\$18.33
2/27/2015	\$18.33
3/2/2015	\$18.33
3/3/2015	\$18.33
3/4/2015	\$18.33
3/5/2015	\$18.33
3/6/2015	\$18.33
3/9/2015	\$18.33
3/10/2015	\$18.33
3/11/2015	\$18.33
3/12/2015	\$18.33
3/13/2015	\$18.33
3/16/2015	\$18.33
3/17/2015	\$18.33
3/18/2015	\$18.33
3/19/2015	\$18.33
3/20/2015	\$18.33
3/23/2015	\$18.33
3/24/2015	\$18.33
3/25/2015	\$18.33
3/26/2015	\$18.33
3/27/2015	\$18.33
3/30/2015	\$18.33
3/31/2015	\$18.33

Exhibit-9**Alternative Artificial Inflation
Ribbon**

6 February 2015 through 29 July 2015

Date	Inflation
4/1/2015	\$18.33
4/2/2015	\$18.33
4/6/2015	\$18.33
4/7/2015	\$18.33
4/8/2015	\$18.33
4/9/2015	\$18.33
4/10/2015	\$18.33
4/13/2015	\$18.33
4/14/2015	\$18.33
4/15/2015	\$18.33
4/16/2015	\$18.33
4/17/2015	\$18.33
4/20/2015	\$18.33
4/21/2015	\$18.33
4/22/2015	\$18.33
4/23/2015	\$18.33
4/24/2015	\$18.33
4/27/2015	\$18.33
4/28/2015	\$9.36
4/29/2015	\$5.40
4/30/2015	\$5.40
5/1/2015	\$5.40
5/4/2015	\$5.40
5/5/2015	\$5.40
5/6/2015	\$5.40
5/7/2015	\$5.40
5/8/2015	\$5.40
5/11/2015	\$5.40
5/12/2015	\$5.40
5/13/2015	\$5.40
5/14/2015	\$5.40
5/15/2015	\$5.40
5/18/2015	\$5.40
5/19/2015	\$5.40
5/20/2015	\$5.40
5/21/2015	\$5.40
5/22/2015	\$5.40

Exhibit-9**Alternative Artificial Inflation
Ribbon**

6 February 2015 through 29 July 2015

Date	Inflation
5/26/2015	\$5.40
5/27/2015	\$5.40
5/28/2015	\$5.40
5/29/2015	\$5.40
6/1/2015	\$5.40
6/2/2015	\$5.40
6/3/2015	\$5.40
6/4/2015	\$5.40
6/5/2015	\$5.40
6/8/2015	\$5.40
6/9/2015	\$5.40
6/10/2015	\$5.40
6/11/2015	\$5.40
6/12/2015	\$5.40
6/15/2015	\$5.40
6/16/2015	\$5.40
6/17/2015	\$5.40
6/18/2015	\$5.40
6/19/2015	\$5.40
6/22/2015	\$5.40
6/23/2015	\$5.40
6/24/2015	\$5.40
6/25/2015	\$5.40
6/26/2015	\$5.40
6/29/2015	\$5.40
6/30/2015	\$5.40
7/1/2015	\$5.40
7/2/2015	\$5.40
7/6/2015	\$5.40
7/7/2015	\$5.40
7/8/2015	\$5.40
7/9/2015	\$5.40
7/10/2015	\$5.40
7/13/2015	\$5.40
7/14/2015	\$5.40
7/15/2015	\$5.40
7/16/2015	\$5.40

Exhibit-9

**Alternative Artificial Inflation
Ribbon**

6 February 2015 through 29 July 2015

Date	Inflation
7/17/2015	\$5.40
7/20/2015	\$5.40
7/21/2015	\$5.40
7/22/2015	\$5.40
7/23/2015	\$5.40
7/24/2015	\$5.40
7/27/2015	\$5.40
7/28/2015	\$5.40
7/29/2015	\$0.00

Exhibit-10**Twitter Closing Prices**

29 July 2015 through 30 October 2015

Date	Closing Price
7/29/2015	\$31.24
7/30/2015	\$31.47
7/31/2015	\$31.01
8/3/2015	\$29.27
8/4/2015	\$29.34
8/5/2015	\$28.48
8/6/2015	\$27.54
8/7/2015	\$27.04
8/10/2015	\$29.50
8/11/2015	\$29.62
8/12/2015	\$29.39
8/13/2015	\$28.54
8/14/2015	\$29.06
8/17/2015	\$29.06
8/18/2015	\$28.30
8/19/2015	\$27.61
8/20/2015	\$26.00
8/21/2015	\$25.87
8/24/2015	\$25.17
8/25/2015	\$24.38
8/26/2015	\$25.03
8/27/2015	\$26.46
8/28/2015	\$26.83
8/31/2015	\$27.79
9/1/2015	\$27.03
9/2/2015	\$27.82
9/3/2015	\$28.30
9/4/2015	\$28.15
9/8/2015	\$27.18
9/9/2015	\$27.18
9/10/2015	\$27.71
9/11/2015	\$27.39
9/14/2015	\$26.90
9/15/2015	\$27.17
9/16/2015	\$27.75
9/17/2015	\$27.41
9/18/2015	\$27.96
9/21/2015	\$27.38

Exhibit-10**Twitter Closing Prices**

29 July 2015 through 30 October 2015

Date	Closing Price
9/22/2015	\$26.83
9/23/2015	\$26.79
9/24/2015	\$26.60
9/25/2015	\$25.29
9/28/2015	\$25.26
9/29/2015	\$25.59
9/30/2015	\$26.94
10/1/2015	\$24.68
10/2/2015	\$26.31
10/5/2015	\$28.15
10/6/2015	\$27.62
10/7/2015	\$29.83
10/8/2015	\$30.32
10/9/2015	\$30.85
10/12/2015	\$28.75
10/13/2015	\$29.06
10/14/2015	\$29.38
10/15/2015	\$29.71
10/16/2015	\$31.15
10/19/2015	\$30.91
10/20/2015	\$30.91
10/21/2015	\$29.30
10/22/2015	\$29.15
10/23/2015	\$30.28
10/26/2015	\$30.89
10/27/2015	\$31.34
10/28/2015	\$30.87
10/29/2015	\$29.06
10/30/2015	\$28.46

Source: CRSP.